PITMAN BIKEBOOKS

SUZUKI
GT 185

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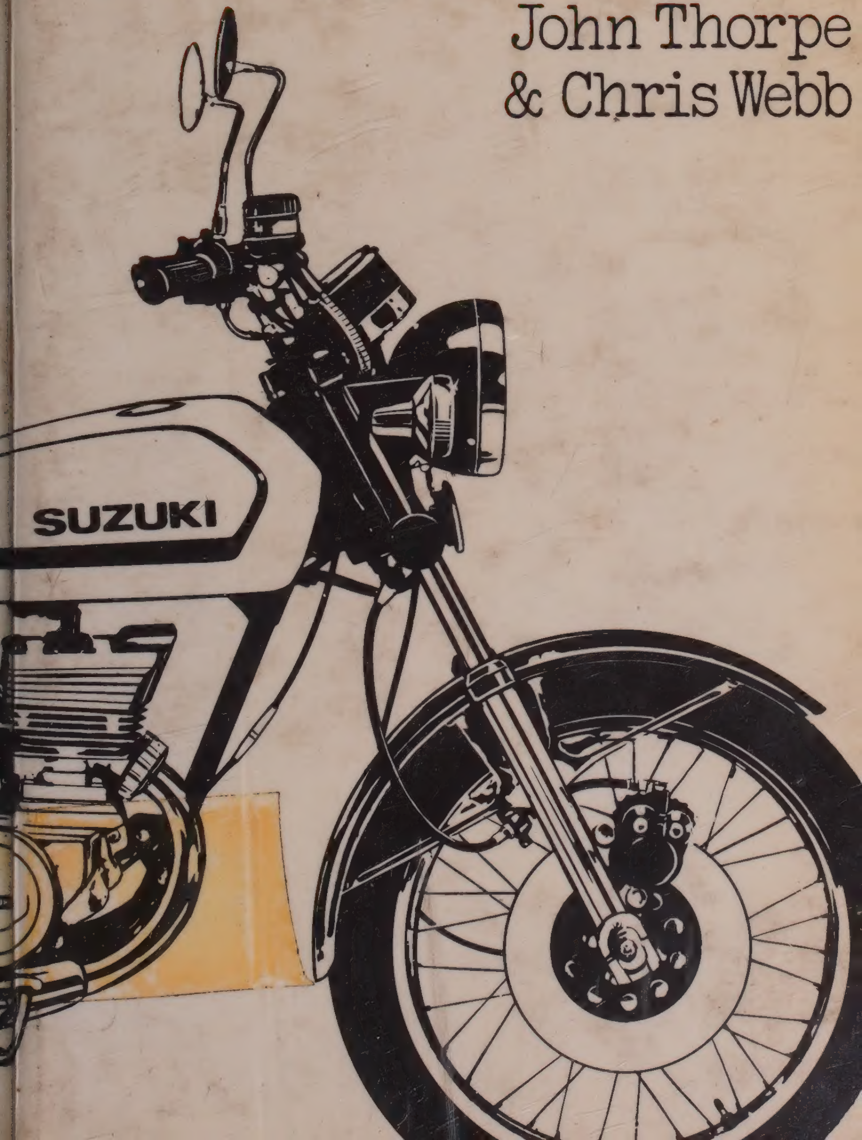
Maintenance · Servicing · Repairs and overhaul · Databank

John Thorpe
& Chris Webb



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& Chris Webb

Bikebook of the SUZUKI GT 185

A guide to maintenance, service and overhaul

Pitman

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Preface
Preaching what I practice...

This book is designed to make *your* motorcycle maintenance *easy.* You will see that I have included a fair amount of general advice on maintenance and on workshop techniques—including the vital safety aspect. It is not there because I *couldn't* have followed the current fashion for filling books such as this with erudite (and, for all practical purposes, useless) information on jobs that not one rider in ten thousand will ever need, or even want, to do. As a practical motorcyclist, still covering upwards of 500 miles every week on two wheels, I prefer to preach what I practice. Hence the insight into my own methods and the emphasis upon the single most important rule of maintaining any vehicle: if it's running well, *leave it alone.* Carry out frequent checks so that the machine will continue to do so, but don't strip serviceable units just for the sake of it.

When you *do* need to strip them, then refer to the Databank section, in which I've collated ample information to enable you to service your motorcycle and renovate its engine, transmission and brakes. There you will find measurements for checking components and assessing wear; schedules and methods for routine maintenance; and easy-to-follow step-by-step overhaul instructions, amply illustrated.

Here I would like to thank Heron Suzuki (Great Britain) Limited for their co-operation in producing data and line drawings; and, in particular, Technical Training Manager Graham Saunders, who cheerfully dismantled a complete engine unit for the photographic sequences.

John Thorpe

1 Do it safely

From the bandages on his hand, I surmised that my friend had met with some kind of accident. The impression was reinforced by the fact that the thumb of his other hand was swollen and its nail a deep purple-black. Some good-natured and thoroughly heartless chaffing on my part soon produced the story behind the injuries. He had been 'doing it himself'. The swollen thumb he had hit with a hammer; the bandaged hand he had cut trying to use a circular saw. And he was, incidentally, a well-known writer on do-it-yourself topics!

Apart from slipping a disc lifting a Dursley-Pedersen bicycle out of the boot of a car, I'm happy to say that I have yet to incur more than the odd cut or bruise myself as a result of my handyman activities, but be warned nonetheless. In the garage, you are dealing with awkward and heavy components; highly inflammable materials; and deadly poisonous gases. You are also quite frequently using tools and equipment with which you are unlikely to be thoroughly familiar, to do jobs upon which you are not fully practised. No excuses, then, for starting this chapter with a series of cautions. You will, after all, save yourself very little time or money if your do-it-yourself activities extend to doing yourself in!

Taking the serious hazards first, watch out for petrol, electricity and exhaust fumes. Never under-estimate spilled petrol; the fumes produced by that float-chamberful slopped on the floor beneath the bike could ignite at the merest spark and, if the flame then just happens to lick and melt the plastic fuel pipe you will have one of the hottest 'bikes in the country in no time!

Always—and I do mean *always*—mop up spilled petrol at once, using absorbent cloth; then open a door to let the floor draught scour away any fumes which have formed. It goes without saying, of course, that you should never have naked lights about when working near petrol—and that goes for cigarettes too. You should also make sure that there is no risk of ignition through sparks (disconnect the battery and tape its terminals out of the way, for instance). And if you think I'm being a bit pernickety, just recall that I also knew a man who burned off his eyebrows when he used a match to peer into a radiator filler at night. The water caught fire! Or, rather, the anti-freeze fumes in the header tank did. Pity about those

eyebrows, though . . .

There is another good reason for disconnecting the battery whenever you work on the machine. Spanners are not insulated and, if you happen to touch a live contact with one, there will be a flash and a horrid smell of burning as the current short-circuits and scorches your hand. It won't do the electrics any good, either—a severe 'short' can burn out solid-state units such as rectifiers and alternator diodes.

If a 6-volt battery can burn you, a 240-volt mains supply can kill. The effect of mains current passing through your body is, first of all, to paralyse—and that means that *you* cannot get to the switch to turn the device off; if you're alone, you'll be lucky to survive. So, with all electrical equipment, make sure that cables and connections are sound; a cut in the insulation is enough to turn a useful workshop aid into a potential killer—yet it takes only minutes to repair. You should never, of course, use tools such as electric drills in any situation where the tool or its cable can get wet or if your hands, clothes or shoes are themselves wet; water is a conductor, remember. It is quite a good plan, in fact, always to stand on a dry rubber mat when using power tools—and when you've finished with them, wipe them over and then check them for electrical safety before putting them away again.

The third of the killers—exhaust fumes—can be neutralized simply by following the commonsense rule that an engine must *never* be run in a closed workshop. Open the door and push the rear end of the bike outside and you can run the engine to your heart's content; you will stand in no danger at all until a burly neighbour stalks round bent on complaining about the noise and/or the interference on his telly! Run the motor with the doors shut, though, and you may never need to bother about that aggressive neighbour again, because exhaust fumes contain monoxide, and carbon monoxide is a deadly gas. Even if you have no intention of being overcome by them, inhaling the fumes can cause permanent blood-cell damage; and if the engine is run with the exhaust pipe only inches from a wall, the build-up can be so deadly that you could be overcome before you realized what was happening.

Motorcycles are deceptive brutes at times, too. It is easy to be mesmerized by the ease with which they can be handled and to forget that one's two-wheeled pride and joy weighs in at about the same poundage as a heavyweight boxer. If the thing topples on to you—or the engine slips on to your foot—you are going to *know* you've been hit!

So, when working on a 'bike, always make sure that it is secure. Do not use a make-shift ramp, constructed out of worm-eaten floorboards from the local demolition site; construct one from angle iron and stout timber with an ample base to support it. Where the machine has to be blocked up, use timber baulks to provide an adequate floor-bearing

surface; and always have enough folk on hand to help with the heavy lifting.

There are other pitfalls to avoid. Hitting hardened surfaces with a hammer, for instance, is a highly dangerous pastime. The hardened surface will chip and slivers of sharp steel can fly all over the place. Whenever you are hitting or drilling, or working under the machine, it pays to slip your goggles on to protect your eyes; even a pair of ex-WD celluloid eyeshields will help—though they won't keep out steel slivers. They will, however, prevent you getting road dirt or oil drips into your eyes; and *that* could save you from a nasty attack of gas gangrene.

Lastly, watch those spanners—and the nuts and bolts on which you are using them. If the spanners are oily, they can slip; they can slip, also, if you use too much force and spring the jaws. You are then very likely to dash your hand against one of the many pieces of sharp and unyielding metal that proliferate on a motorcycle. The same thing can happen if you overstress a bolt and the thing suddenly snaps—as it can, and will, if too much effort is applied.

I expect you're wondering by now how two authors can write so authoritatively as one person! The secret is that in this chapter, and all the other chapters except the Databank, the 'I' is John Thorpe talking. Chris Webb is the bloke behind the spanner in the Databank section.

All of which simply goes to show that life is never simple, and that there is no activity that is devoid of danger—not even the absorbing and pleasant one of tinkering with motorcycles. But just to state the potential hazards is to take you more than halfway to ensuring that they will never happen and, given care and knowledge, the average home mechanic can think himself very unlucky indeed if he ever incurs more than the odd scratch and the occasional rise in blood pressure at the sheer cussedness of things inanimate! So, let us now turn from the dangers and look at the methods of doing some of the more necessary jobs yourself.

2 Tools for the job

Never try to carry out serious maintenance work without the proper tools for the job as the result can only be frustration —and damaged components. The tool kit supplied with the average motorcycle is designed for emergency roadside repairs and for a few simple running adjustments—nothing more. For the workshop, you will need a set of specialist tools that can be built up gradually—so spreading the cost—and which will last you for years.

For Suzukis, the first essential is an adequate range of metric spanners, preferably a socket set backed up by open-ended and ring spanners. The sizes most likely to be needed are 8, 9, 10, 11, 12, 14, 17 and 19 mm, though you may need to purchase the odd extra spanner for specific jobs.

An absolute essential—and if you haven't got one then don't try to strip your engine!—is an impact screwdriver. It will cost you a few pounds but will save hours of struggling with recalcitrant cross-headed screws; in fact, it will probably save its own cost several times over by preventing you from chewing the screw heads and needing to fit replacements! Those cross-heads, of which the Japanese seem inordinately fond, appear to be tightened by specially-trained karate champions, and only an impact driver can loosen them again. Incidentally, if you obtain an impact screwdriver with a $\frac{1}{2}$-in. drive, you can use its bits in conjunction with the speedbrace from your socket set, or with a torque wrench.

In addition, you will need a couple of ordinary cross-head drivers—and make sure you get Japanese ones, since the blades are *not* the same as the European and US patterns— and a couple of fine-bladed screwdrivers for electrical work.

For decokes, make up a couple of scrapers and buy a pair of circlip pliers; snipe-nosed pliers for electrical work and a stout general-purpose pair, with wire cutters, are useful additions to the kit.

If d.i.y. work is to be a hobby, a stout workbench and a heavy-duty vice are good investments; for light work, though, a Mole-type wrench can be utilized as a 'third hand' for quite a lot of tricky jobs.

Your tool kit should include several hammers: one should be a good solid engineer's hammer—not a carpenter's hammer with claws, but either a double-ended club or a ball-

pein type—and a second should be soft-faced. A selection of punches and cold chisels, a stout hacksaw and an electric soldering iron increase the versatility of the home workshop. An electric inspection lamp on a wander lead is an essential item.

Then there are files; you will need at least a couple, one coarse and one fine, though a range of half a dozen should be built up eventually.

'Luxury' items include such things as taps and dies, stud removers and special tools for individual applications; for example—though an essential, not a luxury—a puller for the rotor on these Suzuki twins. Another tool that is becoming increasingly important is the vernier gauge, which enables you to make really accurate measurements. The principle behind it is that the graduations on its secondary scale sub-divide those on the main scale to give readings down to a thousandth of an inch. For example, to measure an external diameter, the jaws of the calliper are brought in until the piece is an exact sliding fit and the cursor is then locked to hold the setting. One reads off, first, at the zero line on the vernier scale. Let us assume that you are measuring a piston and the reading is 49 mm. Obviously, you want to know the diameter more accurately than that, so you then examine the gauge to see which is the first division on the vernier that lines up exactly with a division of the main scale. It may, for instance, be the sixth and, since each division on the vernier is a tenth of a millimetre, that gives you an extra 0·6 mm to add to your total—49·6 mm in all. Internal measurements can also be taken, and depths can be measured using the vernier's sliding rod.

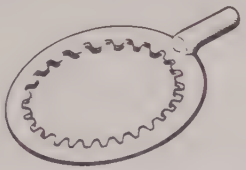


Fig. 1 This tool, used to hold the clutch body steady, can easily be made up by having a short length of steel rod welded to an old clutch plate.

One last essential tool, which you may well be able to make up from scrap wood, is an engine stand. All you need is seven feet of $2\frac{1}{2} \times 1\frac{1}{2}$ in. timber and a few nails. Cut the timber into four lengths of 15 in. and two of 12 in. Make two 15-in. side rails by nailing together pairs to produce rails $2\frac{1}{2}$ in. wide by 3 in. deep. Join these at each end with the 12-in. strips, and you have a stand that is tailor-made for your engine/gearbox unit—one upon which you can carry out all operations up to a complete strip of the engine and transmission.

3 How I do it myself

Every couple of years or so the backroom boys in the experimental departments dream up a spanner to throw into the do-it-yourself works; they come out with some brand new theory that cuts right across the advice that they previously gave. All of which tends to make life interesting for motoring writers! For example, it's not so many years ago that every plug manufacturer in the business recommended that his product should be cleaned, frequently and energetically, by use of a wire brush. Now, the mere thought of it happening is guaranteed to give any self-respecting plug maker a fit. Do that, he'll tell you, and you'll deposit metallic traces all over the nose of the insulator, and that in turn will cause the high-tension current to track to earth and reduce the efficiency of the plug. *Now* he tells us . . . !

So, currently, wire-brushing is out and stiff-bristled brushes are in—until, doubtless, some bright lad in somebody's experimental department discovers that bristles give plugs stubble trouble, or swine fever!

Personally, I'm just a practical motorcyclist, so the advice given here is personal and practical too. This is the way I do jobs myself. No doubt, in a decade or two, they may even once again be the recommended methods. Anyway, they do have one advantage. They work!

Preparation

I make it a rule always to start the job by cleaning the outside of the unit before I start stripping it, partly to ensure that I don't get grit inside the motor—that plays havoc with the bearings and the bore—and partly because disembowelling filthy pieces of machinery with one's bare hands is an unpleasant occupation anyway. You cannot work happily if your hands are covered with filth—leastways, I can't!—and there is always a danger of tools slipping if they're covered with oil or grease from one's fingers. So, my first job is to use one of the several highly effective solvents currently marketed to get the unit dirt-free.

Then the dismantling can start. Or can it? Again, there *are* folk who like to work surrounded by discarded bits and pieces: nuts, bolts, cylinder heads, pistons—all strewn over

the floor. I don't. A clear and clean bench on which to work, and space to move around in, are essentials. So, too, are containers in which to put the parts as they are removed; that way, they don't get mixed up or damaged. This extra preparation takes little more than a few minutes—but it can save hours. And pounds . . .

As the parts are detached from the machine, try to keep them in order. As far as possible, put screws, nuts and bolts back where they came from or keep them in sequence by punching holes in a piece of cardboard shaped to make a holder. That saves having to sort out an infuriating mechanical jigsaw puzzle later on and is particularly useful in the case of crankcase screws and such-like, where the lengths often differ according to the exact location.

Top Overhauls

Call it 'decoking' these days and purists get all uptight. It's a top overhaul, they say, because modern oils and petrols don't cause enough carbon to be deposited to choke up combustion chambers and ports; what you've really got to do is check that the rings are free and undamaged. Well, they could be right, but for my part I still like to check, at the same time, that I haven't got a carbon build-up that will cause pre-ignition or loss of power.

With a two-stroke, a top overhaul means lifting the head and the barrel, and removing the piston for attention to the rings. Fouling of the exhaust system is no longer the bugbear that it once was. Olde-worlde manuals are full of references to boiling the exhaust pipe in caustic soda solution or taking the silencer to a garage to be burned out with a gas torch but, nowadays, an exhaust system is more likely to fail through sheer old age before such antics become necessary . . .

Decarbonizing, of course, means just what it says: you scrape away the carbon deposits that have formed on the internal surfaces. A favourite ploy is to embezzle one of the wife's kitchen knives as a scraper—quite useful, if you can get away with it!—but there is invariably a danger that the steel blade will gouge the soft metal of the head or the piston crown. That's why my own preference is for a stick of wood or solder, sharpened to a chisel-edge, which is just as effective but which cannot cause any damage. This will do three-quarters of the work, though the vital area around the sparking-plug hole—where any carbon build-up could cause misfiring—may need the additional help of a gently-used needle on the lower threads, followed with scraping with a short length of copper wire.

There are two schools of thought about pistons: some say that one should leave a ring of carbon round the crown, to act as an additional oil and gas seal; others say that the crown

should be cleaned off completely. With two-strokes, I prefer the latter method, since in my view the slight improvement in sealing is offset by the increased danger of the carbon becoming incandescent.

So, after the head and barrel have been removed, I detach the piston and gently ease off the rings (Fig. 2). Then I rough scrape the crown and the combustion chamber, finishing off with metal polish applied with steel wool (don't let this touch the sides of the piston, incidentally).

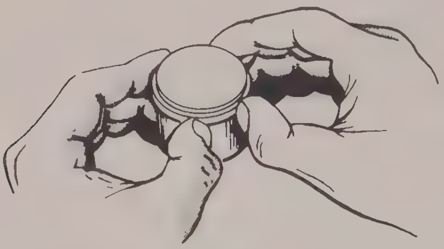


Fig. 2 Piston rings should be expanded out of their grooves very gently, as shown, as they are brittle and it is easy to snap them if too much force is applied.

These days most engines have the barrel and head secured by the same nuts, on long studs passing through the whole length of the barrel from the crankcase. Pistons are located laterally by circlips made of spring steel. I usually winkle mine out with a screwdriver, but it is far easier if you have a pair of circlip pliers with which to compress them. Either way, remember that circlips *are* springy, so keep the mouth of the crankcase covered in case one of them decides to take a leap in that direction. It is, I can assure you, more than somewhat mortifying to watch a circlip disappear into an open crankcase mouth and to know that you will now have to spend some frustrating minutes fishing for it with a hook or a magnet—or perhaps have to remove the engine for further unnecessary dismantling.

With the circlips out of the way, the gudgeon pin that retains the piston on the connecting rod will usually slide out under firm pressure. If it is tight, don't try hammering it with a drift as you may well damage the piston or connecting rod; instead, wring out a rag in water that is as hot as you can bear and wrap it round the piston, leave for a minute, and the resulting expansion should free the pin. All rag used on engine internals, by the way, should be non-fluffy; don't use nylon rag either—it is as non-absorbent as makes no difference!

Should the pin actually need to be drifted out—a last-resort technique—then give the piston ample heating and have a helper support the con rod with a block of wood while

you use a soft drift and hammer to tap the pin through the boss.

Like everybody who has worked on engines, I'd like a pound for every ring that I've snapped in attempts to expand it in or out of its groove. Those of us who are naturally a mite fumble-fingered soon get into the habit of having a spare ring or two tucked away, ready for just such an eventuality. Actually, they won't normally snap unless they have been partly trapped in the groove—perhaps by a minor local seizure—so, if you first ease the ring from side to side to ensure that it is free, the chances of breakage are reduced.

I invariably expand a ring with my two thumbs until I can just ease it away from its peg (Fig. 3) out from the groove and start edging it off the piston. The top ring is easy, of course, since it hasn't far to go; the bottom ring is easy too, providing

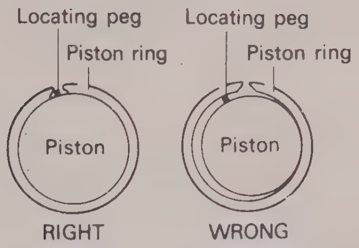


Fig. 3 In a two-stroke, the rings are not free to rotate—they would catch in the cylinder ports it they were. Instead, each ring groove has a peg that prevents the rings from turning. When refitting rings, make sure that they engage snugly against their pegs and do not tend to ride up over them.

you remove it *down* the piston and not up. That way, you don't have to work it over all the other grooves—but do be careful not to let its ends dig into the face of the piston on the way out. Intermediate rings? Well, you pays your money and takes your choice, since whichever direction you move them they will have to go over one or more empty grooves. A trick here, though, is to slide three or four loose feeler gauges under the ring, at points equidistant round the circumference, to act as 'bridges' on which it can slide; it is a useful trick for refitting, too.

If you do break a ring, don't throw it away: it makes a handy little tool for cleaning ring grooves, especially if you file the broken end to a wedge shape. Don't forget to scrape carbon from the inner faces of the rings, incidentally.

Where new rings are to be fitted, I check that the end gap is correct by inserting each ring in turn into its bore and square it up (about $\frac{1}{4}-\frac{1}{2}$ in. from the top) by slipping the piston up from the other end. Then the gap can be measured quite easily with feeler gauges. A gap that is too small has to be made larger by use of a fine file.

With a vernier gauge and a pair of internal callipers, it is possible to measure up the cylinder bore sufficiently accurately to decide whether or not a re-bore is needed. First of all, the vernier is used to establish a datum by measuring the bore diameter right at the top, the point at which no wear has taken place since it is above the travel of the piston. Two measurements—one along the axis of the crankshaft, the other at right angles to it—are all you need. The internal callipers are then used to take, say, three consecutive measurements on the same two axes: one should be made about $\frac{1}{4}$ in. or so from the top of the bore; one about the same distance from the bottom; and the third at mid-stroke. Measure the setting of the calliper with the vernier at each point, applying the gauge across the calliper 'feet'. Mean bore wear per inch of bore can then be calculated. As a rule of thumb, allow that for every inch of bore an acceptable outside bore wear limit would be four thousandths of an inch and you will know whether or not you need to give attention to the barrel.

Bearings and Seals

With the built-up shafts and ball or roller bearings used on two-strokes, there is nothing one can usually do but fit reconditioned or new parts. You cannot, in any case, strip and reset a built-up shaft—it needs workshop equipment—so if a big-end is on its way out it is a new shaft for you.

Oil seals usually consist of a flexible moulding whose lip is spring-loaded to hug the contours of the shaft. Old seals can be eased from the housings using a thick screwdriver as a lever. New ones should be tapped gently home—after greasing their lips—with a block of softwood interposed between the seal and the mallet to guard against damage. Where a splined shaft has to pass through the seal, cover the splined area with masking tape before inserting it to prevent the sharp edges of the spline hacking into that nice new oil seal to produce a nice new oil leak!

Wheel hubs also have seals, to prevent grease entering the brakes and to keep dirt out of the hubs. Removal is usually a matter of winkling out the seals and then inserting a drift from the far side of the hub to tap out each bearing in turn. Such a bearing is grease-lubricated and, before the degree of wear can be assessed, the grease must be washed away immersing in petrol and brushing well and allowing it to drip-dry. It should then be spun, and should revolve easily without grinding noises, with no play when the inner race is pressed alternately towards and away from the outer. Bearings that pass muster—or new ones being fitted—should be pre-packed with the appropriate grade of grease. Ensure that it finds its way evenly into the interstices between the balls or

rollers and the races, but *don't* try to fill the hubs with grease too, just a lining of no more than $\frac{1}{4}$ in. thick. This allows plenty of room for expansion under heat with no danger of the grease melting and seeping out.

Stubborn brutes!

Nothing is more annoying! The 'book' instructs you to unbolt this or unscrew that and when you try to do it you find either that the fastenings are immovable or that the component itself is apparently determined not to be detached.

These things happen—and they've happened to me too. Let's take those stiff fastenings first. Part of the trouble is that, at the factory, they are fastened down with power tools; those cross-headed screws, for example, went in at breakneck speed, propelled by a pneumatic gun. No wonder they won't yield to an ordinary hand screwdriver! You will almost certainly need to use an impact screwdriver; otherwise, the likely result will be a chewed head and a visit to a garage to get *them* to undo the miserable device! One possible solution is to use an ordinary cross-head screwdriver and to tap it smartly several times with a mallet to jar the threads and get the screw turning. It *may* work—but beware: that's usually light alloy you will be dealing with and if you hit just that bit too hard you might well crack the metal rather than shift the screw. Replacement crankcases come expensive . . .

Another method is to apply local heat. That *does not* mean getting a blowlamp or gas torch and playing the flame on the surface, though. You can do that in some instances, but modern light-alloy parts are often finished with lacquer and you will make a fine old mess if you apply a naked flame. Try that 'rag wrung out in hot water' trick that we use to free pins from pistons.

Tight nuts and bolts will often yield to extra leverage or, again, to a judicious tap from the ubiquitous soft-faced mallet, but be careful not to overdo the leverage or the bolt may yield in ways that won't help at all—by snapping off, for instance. Also, there is always a danger that, unless you have top-class spanners, they will simply slip and round off the hexagons. When that happens, use a nut-splitter to cut the fastening in half because you've then got nothing whatever to lose!

With most nuts and bolts, patience is the best solution. I have rarely found a fastener so tightly seized that it would not eventually yield to the blandishments of repeated applications of Plus Gas penetrating fluid; but it can take time—several doses a day for up to a week in extreme cases. If you haven't genuinely got the time to spare, this is a situation where the application of a naked flame to heat the metal is permissible. Make sure there's no petrol in the offing,

though, or you'll get more local heat than you bargained for!

When you are sure that it really is free, the first dodge is always to tap smartly around its joint with a block of softwood. Otherwise, we are back to local heat in an effort to expand it so that it will tend to work itself loose. What must never be done is to try to insert a lever (usually a screwdriver) into the joint, since that is a pretty sure way of damaging the surfaces and often of cracking the component.

In the case of a cylinder head or block, you can usually break the joint simply by refitting the plugs (without connecting the HT leads, though!) and spinning the engine smartly. The compression generated by the pistons will normally be quite sufficient to break the most stubborn of head joints.

You can get stubbornness on re-assembly, too. Be careful here, since it usually means you have got something wrong. For example, if parts are located by dowel pegs and there's dirt or oil in the peg hole, then the dowel won't press home. Attempts to bolt it in with a hammer will simply split the casing—and there's a hefty bill to pay for repairs.

The same applies to bolts that enter blind holes: it is essential to check beforehand that there is no oil at the bottom of the drilling because, if there is, the bolt will act just like the plunger in a hydraulic pump as it is screwed home. The difference is that since the oil has nowhere to go, it will simply transfer the pressure you are applying straight to the surrounding material. You will then hear a sudden and ominous crack!

Except in the case of those that are near heat—plug threads, for instance—it is a good idea to give threads a light coating of lubricant before screwing the fastenings home. Graphite is the best of all—even rubbing the threads with a pencil will make them easier to undo next time; otherwise, use a thin oil. There are exceptions to the rule, though, since some fastenings have to be torqued with the threads dry.

Beware of over-tightening. The best method is to be absolutely sure and to use a torque wrench on each and every nut and bolt where such settings are specified by the factory. If you can't, then take the fastening up just as far as it will go under firm hand pressure. Spanners are made in lengths that will give adequate holding power on nuts and bolts when just that much leverage is applied. If you want to be fussy, of course, you can add a turn through one extra flat.

The great exception is when tightening sparking plugs. They should be taken down until the interposed washer just flattens and then be given an extra 1/32 of a turn and no more. Otherwise, you may distort the plug and induce air leakage, causing overheating and seizure.

4 Databank

Engine, General

Bore, 49 mm × stroke 49 mm, two cylinders = 184 cc
Compression ratio (corrected), 7·0:1
Nominal power, 21 bhp at 7500 rpm
Sparking-plug gap, 0·7 mm/0·028 in.
Recommended plugs, NGK B-7HS or Nippon Denso W-22FS
Recommended oils, Texaco Motor Oil 2T (also Castrol TT, Shell 2T, Duckhams' Two-stroke)
Oil tank capacity, 2·1 pints (1·2 litres)
Ignition timing, K and L models, 20° BTDC or 1·83 mm piston travel before TDC, both cylinders (M models 2·62 mm, A models 2·64 mm)

Engine, Checking data

Bore, standard, 49 mm
Outside limit of bore, Standard plus 0·005 in.
Piston/bore clearance, 0·005 in/0·12 mm at a point 25 mm above piston skirt and 5 mm above exhaust port

Transmission, General

Primary reduction, 3·210:1
Gearbox reduction, (1st) 2·750; (2nd) 1·812; (3rd) 1·250; (4th) 1·000; (5th) 0·800
Secondary reduction, 2·857
Overall reduction, (1st) 25·225; (2nd) 16·625; (3rd) 11·466; (4th) 9·172; (5th) 7·338
Recommended oil, branded 20W40
Gearbox capacity, 800 cc, 1·41 pints

Transmission, Checking data

Clutch lever, free play, 3 mm at cable
Clutch friction disc thickness, 2·8/3 mm

Carburettor, Checking data

Type, twin Mikuni VM 20SC
Bore, 20 mm

Main jet, 72·5
Jet needle, 4D17-3
Needle jet, N-5
Cutaway, 1·5 mm
Pilot jet, 20
Pilot outlet,1·2
Pilot air screw setting, 1·0 turns open
Starter jet, 40
Fuel level, float chamber, 19 mm
Needle valve seat, 1·2

Electrical, General

Generator, 12 V AC alternator
Charging range; with load, 17·5 V at 7 amp
Battery, 12 V, 11 ah
Specific gravity, charged, 1·260–1·280 at 68°F
Earthing, negative earth

Electrical, Checking

Contact-breaker gap (both contacts), 0·012–0·016 in.
Fuse, 15 amp
Bulbs: headlamp, 12 V 35/25 W; tail/stop lamp, 12 V 5/23 W; indicators, 12 V 23 W; speedo light, 12 V 3·4 W; rev. counter, 12 V 3·4 W; neutral indicator, 12 V 3·4 W; flasher warning, 12 V 1·7 W; main beam warning, 12 V 3·4 W

Frame and forks, Checking

Steering head bearing, 22 balls top, 18 bottom
Castor angle, 63°
Trail, 102 mm

Tyres, Checking

Tyre size, front, 2·75–18 4PR
Tyre size, rear, 3·00–18 4PR
Tyre pressure, front, 24 psi
Tyre pressure, rear, solo, 28 psi
Tyre pressure, rear, pillion, 31 psi

Torque wrench settings

Cylinder head nuts, 14/18 ft-lb
Front axle clamp nuts, 11/18 ft-lb
Front axle nut, 26/38 ft-lb
Front fork, upper clamp bolt, 14/22 ft-lb
Front fork, lower clamp bolt, 18/25 ft-lb
Steering stem, head bolt, 25/40 ft-lb

Steering stem nut, 43/72 ft-lb
Handlebar, clamp bolt, 9/14 ft-lb
Front footrest, bolt, 7/11 ft-lb
Rear damper nut (upper and lower), 14/22 ft-lb
Rear swinging arm, pivot nut, 22/33 ft-lb
Rear brake, link nut (front and rear), 7/11 ft-lb
Rear brake, cam lever nut, 4/6 ft-lb
Calliper, fixing bolt, 18/28 ft-lb
Brake hose, fixing bolt, 11/18 ft-lb
Brake hose, joint, 18/25 ft-lb
Brake bleed screw, 5/6 ft-lb
Rear axle nut, 26/38 ft-lb

Operation 1: Routine maintenance sequences

After first 500 miles

1. Change gearbox oil
2. Top up engine oil tank
3. Top up brake fluid
4. Top up and clean battery
5. Clean/adjust sparking plugs
6. Check contact-breaker points gaps
7. Adjust ignition timing
8. Lubricate contact-cam felt
9. Adjust carburettors
10. Adjust oil pump
11. Lubricate and adjust control cables
12. Clean fuel strainers
13. Change front-fork oil
14. Check steering-head adjustment
15. Check brake adjustment
16. Lubricate chain
17. Check wheel spokes
18. Lubricate swinging-arm bushes
19. Lubricate front-fork bushes
20. Check instruments and lights

Every 2000 miles

Repeat 500-mile service except items 12, 13, 17 and 18. In addition:

21. Clean and adjust carburettors
22. Clean air-cleaner elements
23. Check tyres for wear and correct pressure

Every 4000 miles

Repeat 2000-mile service except items 5 and 22, but including 13 and 17. In addition:

24. Renew sparking plugs
25. Decoke mufflers

26. Decoke cylinder head

Every 6000 miles
Carry out 500-mile service except items 14 and 17

Every 8000 miles
Carry out 4000-mile service except items 6 and 9. In addition:

27. Overhaul carburettors
28. Renew contact breakers
29. Renew fuel pipes

Routine maintenance, methods

You've heard the old saying about the cat that was killed by kindness. The same thing can happen to that purring motorcycle of yours if you fall into the trap of neglecting everyday maintenance in favour of all-too-infrequent major overhauls.

There is always a temptation to let the little jobs slide and to have a really good 'pull-it-apart' session two or three times a year. Unhappily, that's a sure way to shorten the bike's life and reduce its efficiency. All mechanical parts need time to settle down when they've been disturbed, since you can *never* re-assemble a unit so precisely that every part is in exactly the same position as it was before. Every time you dismantle, that component needs some hundreds of miles of running before it beds itself in again and that is why major overhauls should be carried out only when they are strictly necessary. While the machine's running well, don't strip it.

It will only run well, though, if a constant check is kept on all the settings and adjustments that can alter, slowly, as the miles mount up. That is what routine maintenance is all about—simply restoring settings to normal.

You can do it on an elapsed-mileage basis, but you sometimes then need the figuring ability of an accountant and the memory of an elephant. The better answer is to adopt a system of either daily or weekly checks—something that can become a matter of routine and need occupy no more than a couple of minutes at a time. The idea, remember, is to check. If the check shows that a setting is within acceptable limits, then it's a waste of time to make an adjustment. So, here are a couple of typical routines you could adopt:

Daily system
Sunday: check brake-fluid level; adjustment of rear brake; check security of nuts and bolts in braking system.
Monday: check engine and gearbox oil levels; check all controls for lubrication and free movement.
Tuesday: check battery; check electrical connections; check all lights; check horn; check exposed wiring for abrasion.

Wednesday: check tyre pressures; check treads for depth and trapped stones; check sidewalls for damage; check front and rear spindle nuts and front clamp bolts; check for play in wheel bearings, head bearings and suspension pivots.

Thursday: check clutch-cable adjustment; check clutch action.

Friday: check chain adjustment and lubrication.

Saturday: check sparking-plug gap and condition; check contact-breaker points.

Weekly system

Week One: carry out the checks given above under 'Sunday' and 'Saturday'.

Week Two: carry out the checks given above under 'Monday' and 'Friday'.

Week Three: carry out the checks given above under 'Wednesday'.

Week Four: carry out the checks given above under 'Tuesday' and 'Thursday'.

In each instance, of course, you must first carry out a full check on all the points given here, plus the periodic oil changing and greasing, so that the machine starts off in first-class order. Thereafter, these regular checks—I'd recommend the daily ones where the machine is in use five or six days every week—should ensure that it keeps that way. Oil changing, greasing, decokes and so on, will still need to be done on an elapsed-mileage basis but, if you keep a record of the odometer reading for each operation, that is simple enough. One way for forgetful folk like me is to tape the mileage for the next oil change, for instance, inside the tool box, where you're bound to see it.

Always stick to brands and grades of oil and brake fluid recommended by the factory, incidentally, and don't try to cut costs by using 'unknowns'. Lubrication is critical, especially on heavily-loaded gear teeth and the hardworking pistons of a two-stroke twin. As for brake fluid, it's essential that a recommended hydraulic fluid be used. *Don't* use engine oil, paraffin or cleaning fluid in the system—they will cause the hydraulic seals to swell and you'll lose all the braking on the front wheel.

Cable adjustments

Cables control the clutch, the two carburettors and the oil pump. The method of adjustment is similar for all.

What happens is that the outer casing can be varied in relation to the inner cable length simply by altering the setting of a screwed adjuster. Screw the adjuster out and you increase the effective length of the outer cable, so reducing the free play in the system it controls; screw the adjuster in and you

shorten the effective length of the outer cable and increase the play. Adjusters usually have a lock-nut to hold the setting; loosen this first and you'll most likely find the adjuster can be turned by hand; when the setting is right, hold the adjuster firmly with an open-ended spanner and re-tighten the lock-nut.

With throttle cables, try to aim for a setting that gives just perceptible free play at the cable adjuster above each carburettor before the slide starts to lift. With the throttle closed this free play should be around 0·5–1 mm (0·02–0·04 in.). To be absolutely accurate, remove the air cleaner and the flexible pipes on the intake side of the carburettors and use a mirror to check that both slides open simultaneously when the twist grip is opened.

Clutch setting

There are two adjusters at the clutch cable—one at the lever itself and the other in the centre of the cable, just in front of the cylinder heads (Fig. 4). There should be a clearance of 3 mm between the inner and outer cables which can be checked by pulling the outer away from the adjuster and noting how much it moves (Fig. 4). If any adjustment is needed, loosen the lock-nut and screw the two halves of the adjuster in or out to obtain the appropriate clearance.

The 3 mm clearance can be re-checked at the lever end (Fig. 5) and any small corrections made by the adjuster there.

Oil-pump setting

As the throttle is opened, the oil pump feeds extra lubricant into the crankcase, and to check that the metering is correct, the oil-pump arm is synchronized with the carburettor slides as follows.

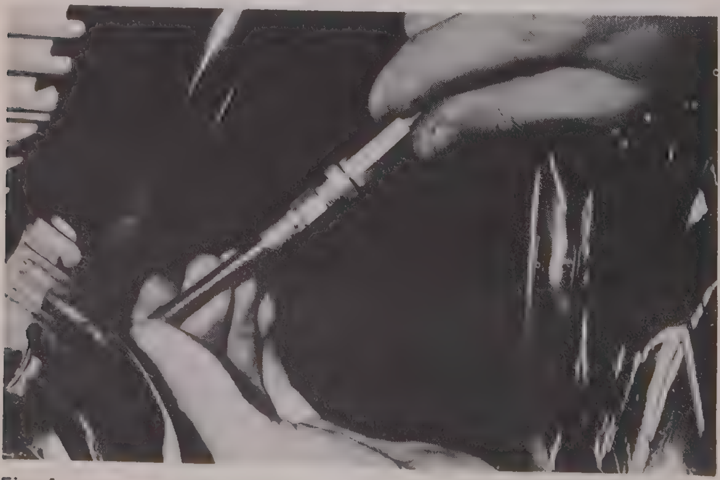


Fig. 4

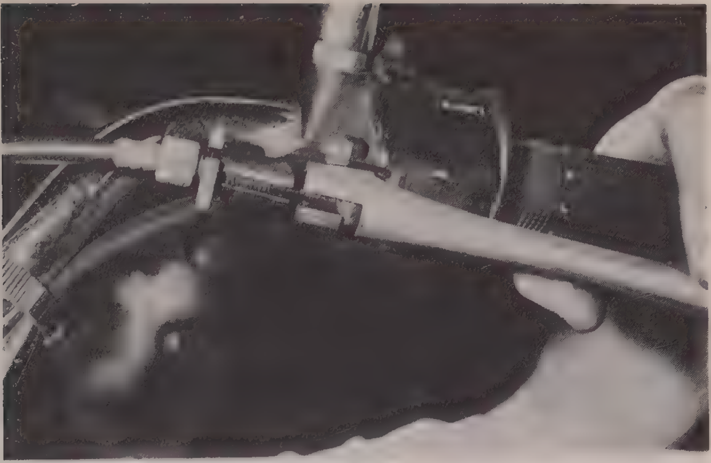


Fig. 5

At the pump, remove the cover. The right-hand carburettor has a blanking plug on the outside of the slide barrel. Take it out and have a friend slowly open the throttle. As the throttle slide rises inside the barrel, you will see a round dot on the slide through the viewing hole. When this dot is near the top of the plug-hole, tell your helper to keep the throttle in that position while you check the oil-pump arm. A mark scribed on this arm should be in line with a similar mark on the pump casing (Fig. 6). If the marks don't align, adjust the pump-operating cable until they do.

Oil-pump adjustment must always be carried out *after* adjusting the carburettor throttle cables, since throttle-cable adjustment can alter the synchronization of the oil pump.

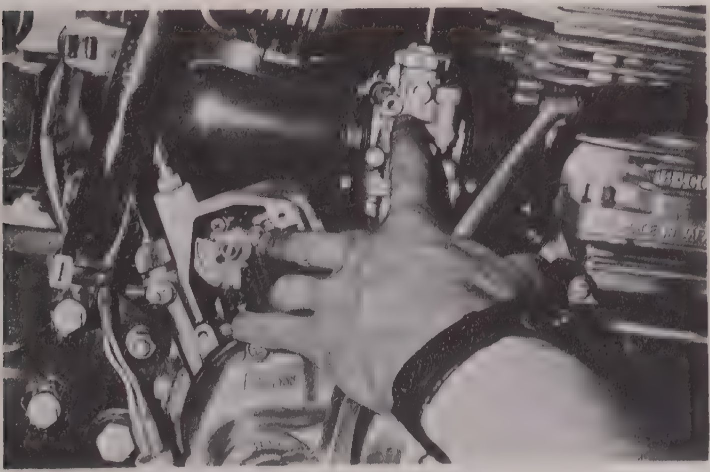


Fig. 6

Fig. 7

Rear brake setting
Adjustment is made at the brake arm end by screwing the adjusting nut in or out until the brake-pedal pad travels between 20 and 30 mm (0·8–1·2 in.) before the brake shoes contact the drum (Fig. 7). There is a brake-lining wear indicator on the rear brake arm.

Stop-lamp setting
Associated with the rear brake, the stop lamp has a switch that can be adjusted to bring on the brake light earlier or later. The body of the switch has two adjusting nuts—one above the holder and one below. To bring the light on earlier, screw the lower nut down its thread, lift the switch body and spin the upper nut down to the holder; reverse the procedure if you want the lamp to come on later. Ideally, the lamp should light when the pedal is halfway through its travel; once the setting is right, tighten the nuts.

Plug setting
Remove the terminal caps and use a plug spanner to undo the spark plugs from the head. Inspect the electrodes for condition and, if they are fouled, have them sand-blasted by a garage or clean the carbon off yourself using a stiff-bristled brush. Check the gap between the electrodes; it should be 0·028 in. If the gap is too small, gently bend the side electrode up with a screwdriver; if it's too wide, tap the top of the side electrode gently with a spanner to narrow the gap. The gap is correct when the correct size feeler blade will just slide in. It's a good idea to double-check by re-measuring with the correct feeler plus a very thin feeler blade—usually the thinnest of the set will be 0·002 in. If the correct feeler fits,

but the correct blade plus 0·002 in. won't enter, then the gap is right and the plug can be re-fitted.

Contact-breaker points

Two sets of contact breaker points are housed under a cylindrical casting on the left hand side of the engine (Fig. 8). The

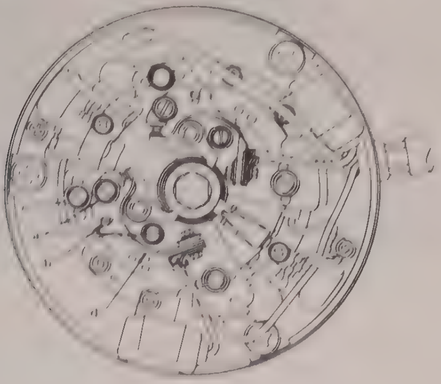


Fig. 8

cover can be removed after undoing a number of cross-head screws. The contact breaker points are opened by a cam driven by the crankshaft and closed by a spring blade.

To check the gaps, rotate the engine either using the kickstarter or a spanner on the bolt head at the end of the cam until one set of contacts is fully open. Use a feeler gauge to check the gap, which should be 0·012–0·016 in.

If the gap needs adjusting, loosen the two screws (a, Fig. 8) and turn the eccentric screw (b). When the gap is correct, re-tighten screws (a).

Cleaning the points is an operation that should be carried out before adjustment a couple of times a year. In use, points tend to burn and a pile forms on one contact and a corresponding crater or pit on the other. Don't worry about the pit as it has no effect, but the pile does, and it should be removed with a points file or—better still—the contact with the deposit on removed and the pile smoothed away with a carborundum stone. Don't remove more than the pile, otherwise the life of the contacts will be considerably shortened.

After cleaning and re-gapping, insert a piece of clean card between the contact faces and turn the engine so that the contacts close on it. Pulling out the card will now wipe any traces of oil from the contacts.

Ignition timing

Accurate ignition timing is critical on this engine for optimum performance, and although Suzuki provide a pointer and mark

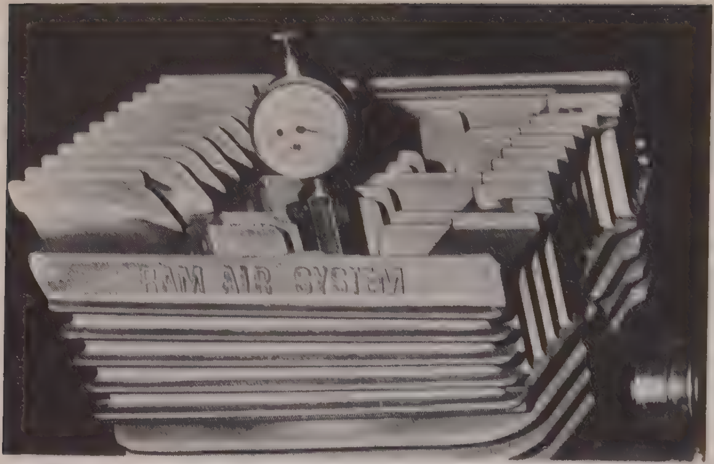


Fig. 9

on the contact-breaker cam which gives an approximate guide to ignition timing (the pointer can be seen in the four-o'clock position in Fig. 8), this is for guidance only and checking should be carried out using the correct instrumentation—a dial gauge and a buzzer or test lamp.

On the GT 185 the spark plug should fire when the piston is 1·83 mm before Top Dead Centre. There is an allowance of + 0·58 mm so, in practice, the piston can be 1·83–2·41 mm BTDC when the plug fires.

The plug is triggered by the opening of one contact breaker, and to check the ignition timing we measure the distance the piston is before TDC at the instant the appropriate contact-breaker opens. We can tell when the contacts just begin to separate if we wire a buzzer or a low-wattage 12-V

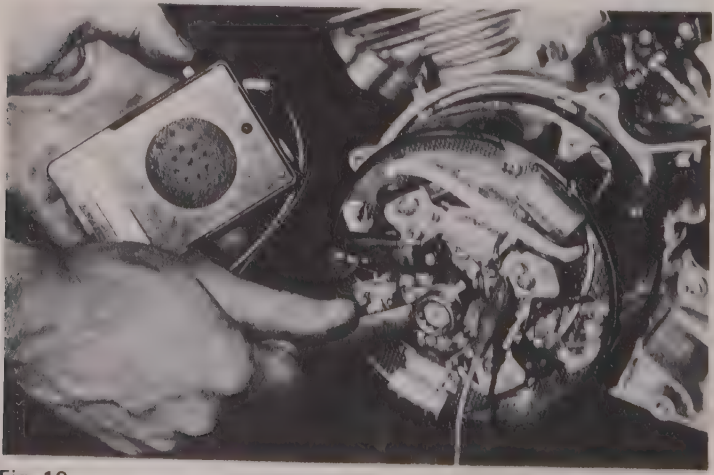


Fig. 10

test lamp between the contact-breaker spring blade and an earth point on the crankcase. The instant the buzzer sounds or the bulb lights, the points have opened.

To set the timing, remove both spark plugs and fit the dial gauge in the one plug hole (Fig. 9). Turn the engine, using a 12-mm spanner, on the cam bolt and adjust the dial needle so it shows zero with the piston at top dead centre. Wire the buzzer or test lamp to correct the contact breaker (Fig. 10). The upper contacts operate the right-hand spark plug and the lower ones the left one.

Turn the crankshaft slowly clockwise but stop turning when the sound of the timing buzzer changes or the test lamp *just* comes on. At this point the gauge should be reading 1·83–2·41 mm. Check both cylinders in the same way.

If the timing needs adjustment, loosen the two screws (c in Fig. 8), and insert a screwdriver in slot d to turn the base-plate. Moving the plate in the same direction as crankshaft rotation retards the ignition (the spark will occur with the piston nearer TDC), while turning the base-plate clockwise advances the ignition.

Operation 2: Decarbonizing

Take off the carburettors and exhaust pipes (see 'Engine Removal') and undo the four cross-head screws holding the cylinder-head top cover. Undo the eight 14-mm cylinder-head nuts and lift the single-piece head (Fig. 11).

The two cylinder barrels are each held by four nuts at the base. There is a small gap between the cylinders, and it's wise to clear any dirt from this area using a feeler gauge and a tyre pump before the first cylinder is lifted—this prevents dirt

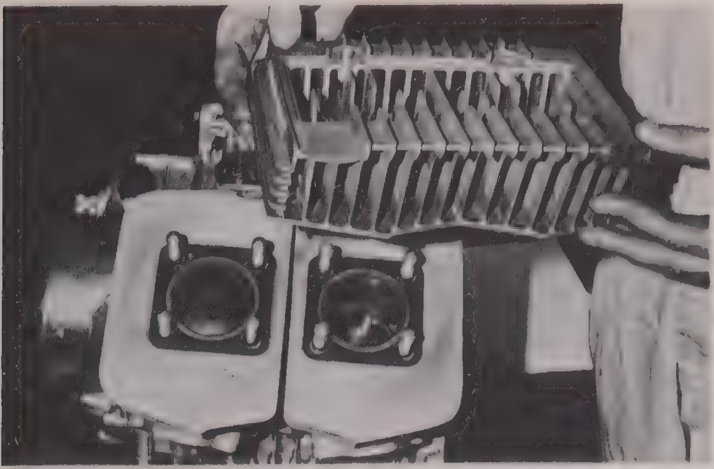


Fig. 11

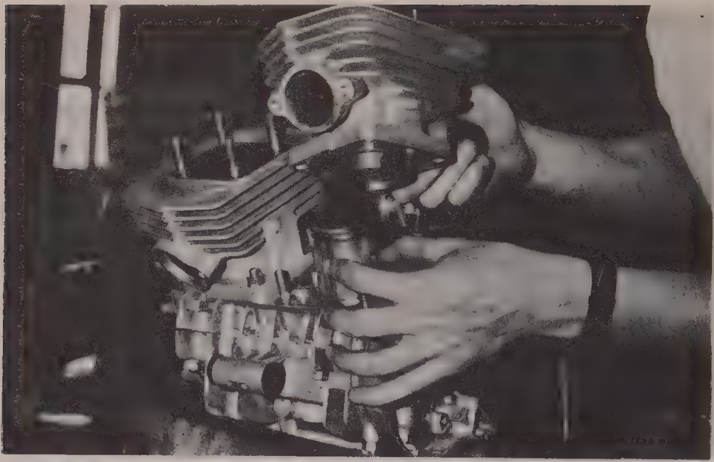


Fig. 12

dropping into the crankcase. Once the area between them is clean, the 12-mm nuts can be removed and the barrels lifted out (Fig. 12). Make sure each piston is supported as the cylinder is lifted clear.

Most of the carbon will be in the exhaust port: gently scrape this clean following the general decarbonizing data given in Chapter 3.

Circlips locate the gudgeon pin in the piston. Remove these, preferably with clip pliers, and the pin can be pushed out using hand pressure on an old screwdriver (Fig. 13). Note that each piston is marked on the crown with an arrow which points to the front. Mark each piston so that it can be fitted back into the same cylinder.

The needle roller bearing in the con-rod little end can be

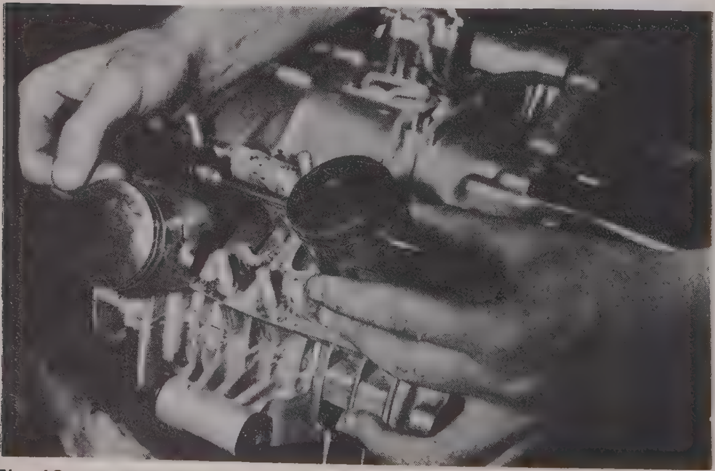


Fig. 13

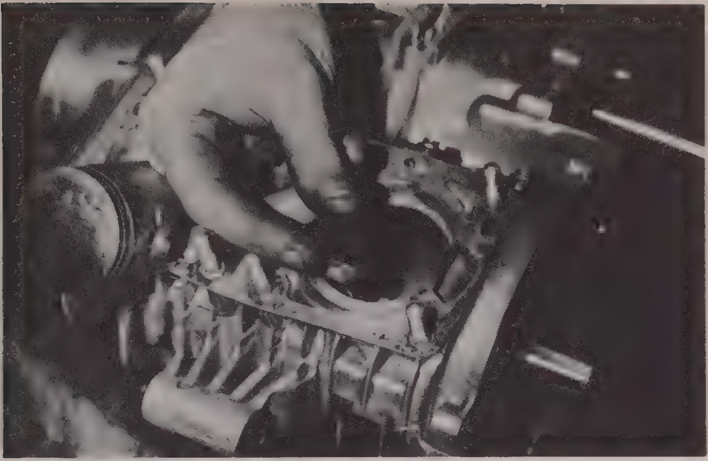


Fig. 14

pushed out with the fingers (Fig. 14). Check the rollers for scratches and the cage between the rollers for high spots. In theory, the cage shouldn't touch the gudgeon pin or piston, and if it's shiny between the rollers, the rollers themselves have worn. If this has happened, the gudgeon pin will be worn too—there will be a step where the roller cage has worn it—and this should be renewed as well.

On re-assembly, fit new gaskets to the cylinders top and bottom, tighten the 12-mm cylinder hold-down nuts to 14–18 ft-lb, and tighten the cylinder-head nuts to 14–18 ft-lb in the order shown in Fig. 15.

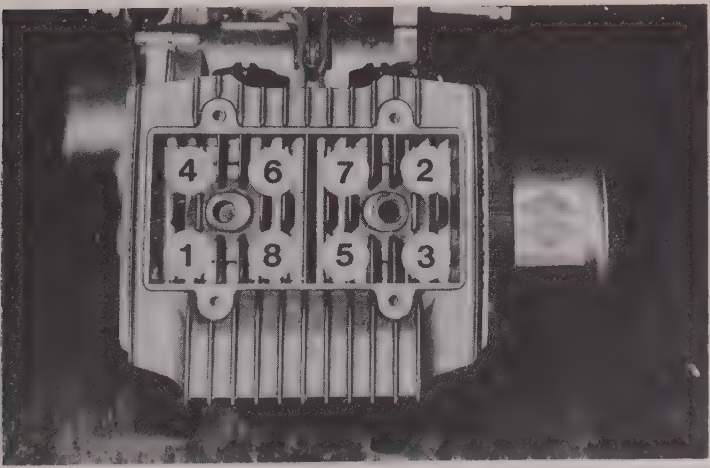


Fig. 15

Fig. 16

Operation 3: Engine removal

Drain the transmission oil by unscrewing the plug under the crankcase. Before working on the engine, remove the dual seat, set the diaphragm petrol tap to the 'on' position and disconnect the two fuel pipes and remove the petrol tank. Also disconnect the battery and the spark-plug HT cables.

Remove the exhaust pipes which are held by two bolts each to the cylinders (Fig. 16), remove the rear footrests and unbolt the silencers to release the complete exhaust system.

Disconnect the pipes, wires and cables next. These include the feed pipe from the oil tank—don't forget to block the pipe stub, a No. 8 woodscrew does this nicely (Fig. 17). The clutch cable is detached at the lever, and the oil-pump cable and tachometer drive cable from the top of the oil pump.

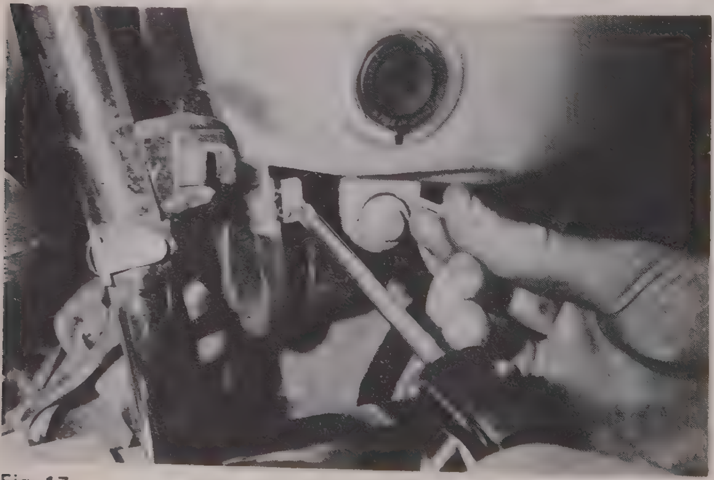


Fig. 17

Fig. 18

Remove the right-hand cover and disconnect the generator wiring harness and battery feed cable (arrowed, Fig. 18).

The control cables to the carburettors are disconnected by unscrewing the carburettor mixing-chamber tops and swinging them, complete with slides and needles, over the frame and out of the way. The air cleaner assembly can be detached after undoing the bolts under the dual seat, after which the hose clips holding each carburettor to the rubber in-take stub can be loosened and the carburettor bodies removed.

Mark the gearchange lever so that it can be refitted on the same splines, release the pinch-bolt and draw it off its shaft. On the chain side, remove the sprocket cover, undo the spring link and unwrap the chain from the sprocket.

You can now turn your attention to the engine mountings. The crankcase is held to the frame by three through-bolts, one up front between the exhaust pipes (see Fig. 16), another near the bottom, and a third at the rear behind the oil pump.

Remove the front and bottom bolt. Have a helper steady the engine while you undo the third bolt. As the nut securing this is slackened, the engine will swing down in the frame and sit between the lower mounting lugs. Remove the third bolt and, with the helper still steadying the engine, undo the remaining nuts holding the triangular plate supporting the rearmost bolt. Removing the plate will allow the engine to be lifted and removed from the frame from the right-hand side.

Operation 4: Engine strip

Before dismantling the engine, thoroughly clean the outside to remove all road dirt and grit. This is best done using a

Fig. 19

grease solvent—Gunk or Jizer, to name but two—followed by a hose down with water. You can, if you prefer, use paraffin and a stiff brush instead.

Cleaning the unit has two advantages. First, it makes working on it easier because your hands stay reasonably free of grease. Secondly, there is no danger of dirt getting at the internals and causing damage or leaks on re-assembly.

With the engine unit clean, begin dismantling by removing the cylinder head, cylinders and pistons as already detailed for a decoke.

On the sprocket side, remove the generator stator assembly (Fig. 19) which is held by three bolts. Before the stator can be removed completely, unscrew the neutral indicator light cable from the switch (Fig. 20).

Fig. 20

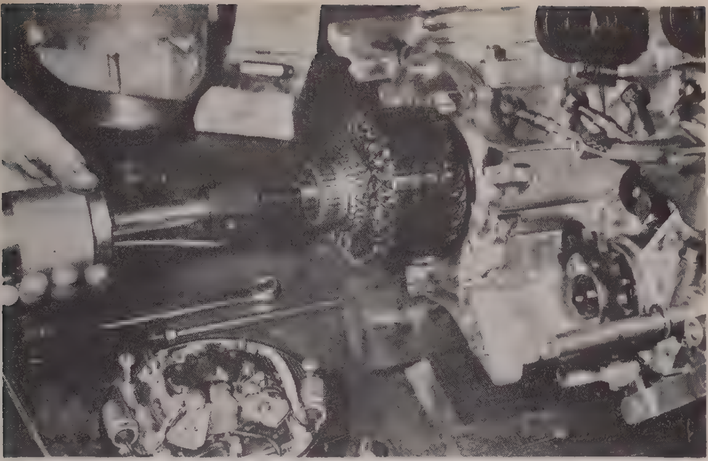


Fig. 21

By rights, the generator rotor or armature needs a special tool to remove it, as shown in Fig. 21, but it's possible to do without it if you are prepared to improvise.

First remove the contact-breaker cam on the end of the rotor shaft: it's secured by a 12-mm headed bolt and is keyed on the shaft. Once this is out of the way, you need a 10-mm threaded bolt which fits the threads inside the end of the rotor, and a $\frac{1}{4}$ BSF bolt, 1 in. long, and with the head cut off. Push the headless bolt into the hole so that it enters the end of the crankshaft. Screw the 10-mm bolt into the rotor. The end will bear on the $\frac{1}{4}$ BSF bolt and, with luck, force the rotor off the crankshaft. During this operation you must stop the engine turning—the easiest way is to put two blocks of wood on the crankcase to protect it, then pass a bar through one

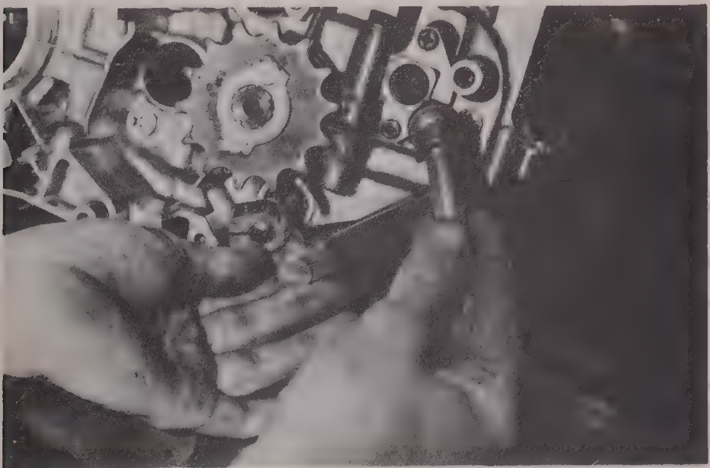


Fig. 22

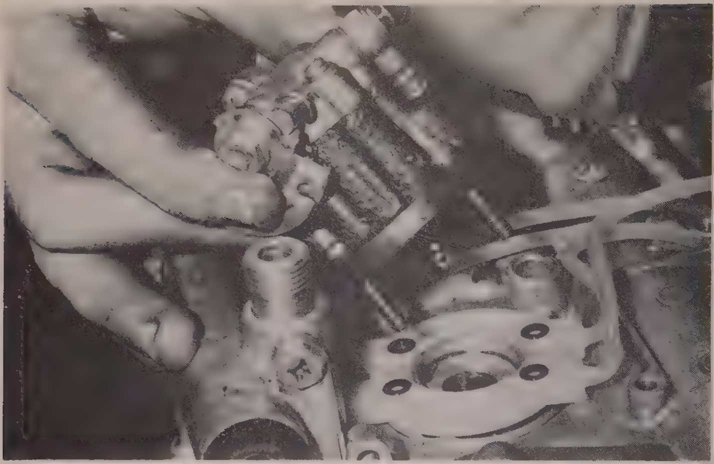


Fig. 23

connecting rod and turn the engine so that the bar rests on the timber.

On the same side of the engine, remove the gearshift link (Fig. 22). Before undoing the pinch-bolt, note the position of two adjacent centre-pop marks on the splined shaft and the lever hub. These must be re-aligned correctly in re-assembly

Fig. 24

Fig. 25

otherwise you will not be able to select first gear. Once the pinch-bolt is removed, the rest of the linkage simply pulls out.

Remove the oil-pump cover, then the screws holding the oil-pump to the crankcase (Fig. 23). Try to keep the pump reasonably upright as it is lifted clear because the transverse driving pin at the end of the shaft is a free sliding fit—if you tilt the pump too much, the pin drops out.

Unscrew the four unions securing the transparent oil-supply pipes to the crankcase (Fig. 24). Early machines use plastic washers between the banjo unions and the crankcase, and in time these washers may crack and leak oil. It's therefore advisable to change them for later-type copper sealing washers.

Mark the kickstarter in relation to its shaft, remove the

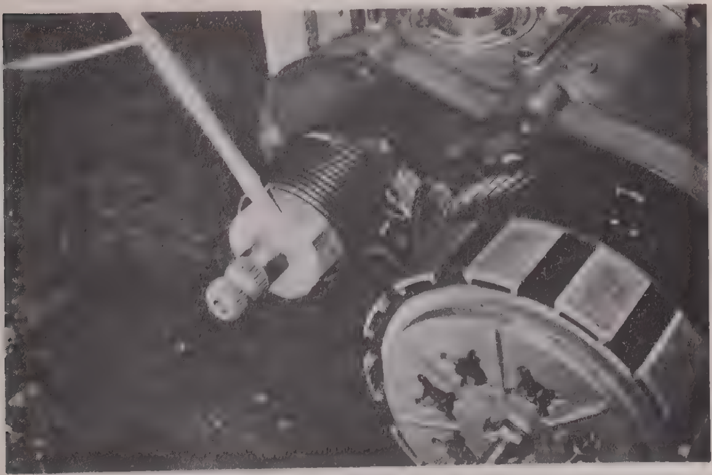


Fig. 26

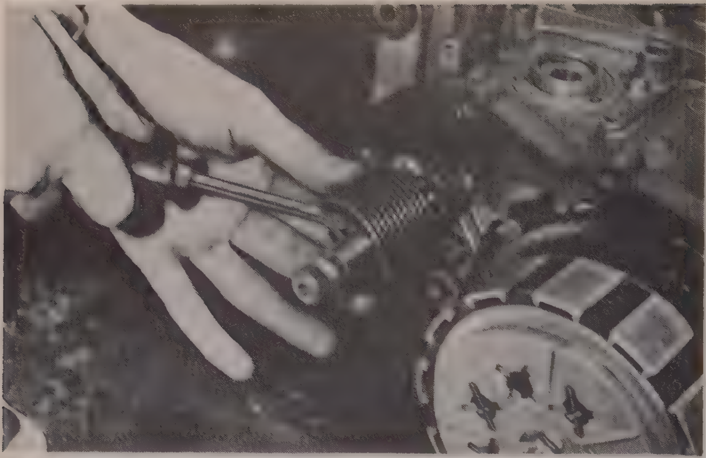


Fig. 27

pinch-bolt and draw it off the splines then undo the screws securing the clutch cover and take it off (Fig. 25). The cover-retaining screws are of different lengths. You can identify them for re-assembly by dropping them into the original holes in the casing after it is removed or chuck them in a heap and sort them out later on the basis that all screw heads should be proud of the top of the casing by the same amount before tightening.

Prise off the kickstart spring retainer (Fig. 26) using an old screwdriver, then use the same tool to lever the end of the spring from the hole drilled across the kickstart shaft (Fig. 27) and take the spring off. The inner end of the spring engages in a recess in the casing. We can now turn our attention to the clutch.

Suzuki produce a special tool to hook on to each of the

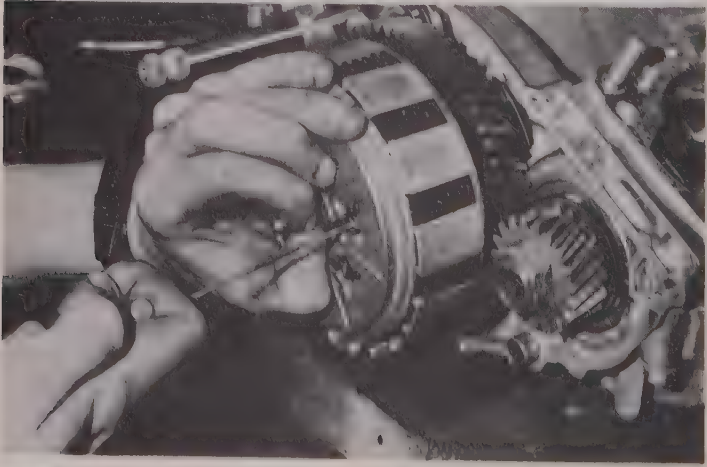


Fig. 28

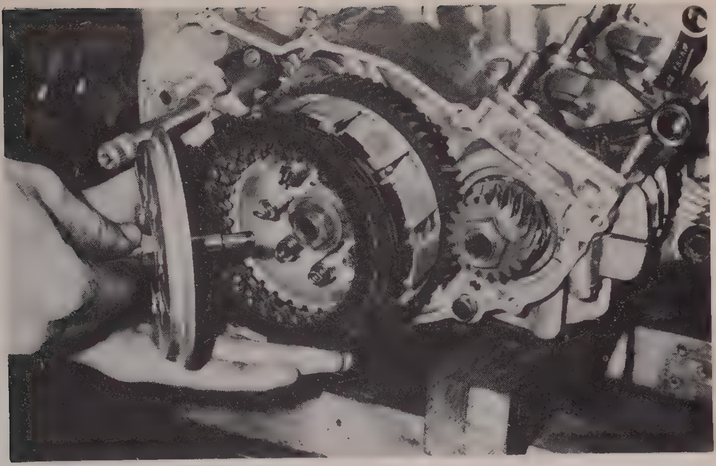


Fig. 29

springs (there are seven) and take the tension while the spring pins are withdrawn (Fig. 28). You can make up a similar tool using a bicycle spoke or length of piano wire bent round a wooden or metal pipe handle with a small hook bent at the other end.

Once the pins are off, the pressure plate, the end of the release rod and the clutch plates themselves (Fig. 29) come out. There are 11 individual plates in all, six of them friction ones and five of plain metal, and they are alternately sandwiched together with a friction plate at each end. The complete assembly is shown in Fig. 30.

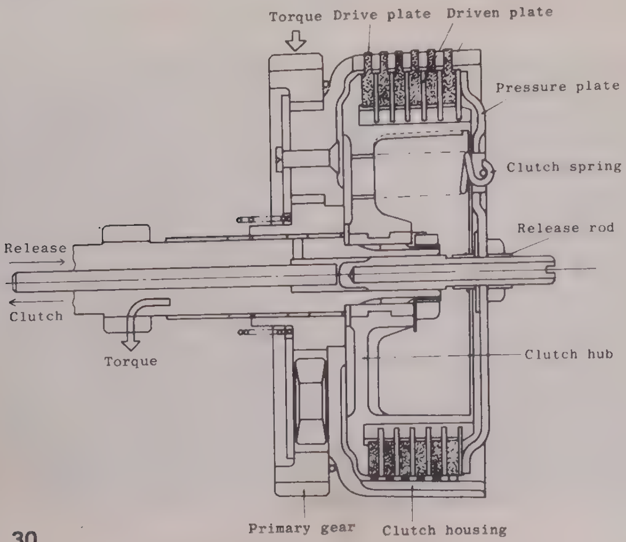


Fig. 30

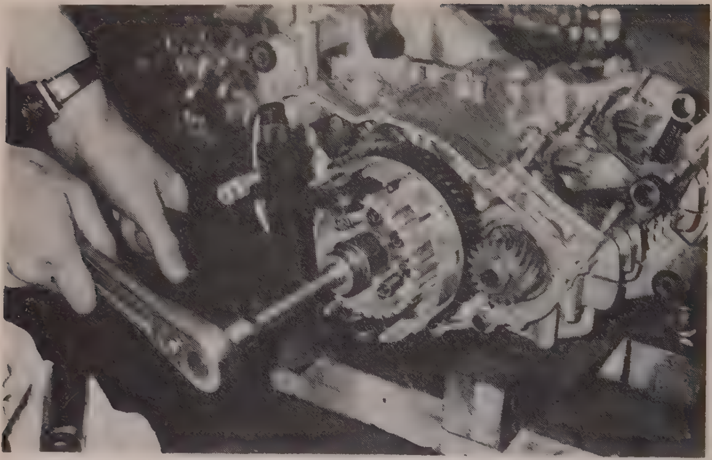


Fig. 31

You next need a special tool to restrain the clutch hub while the 22-mm centre nut is undone. The special tool shown in Chapter 2, made from an old clutch plate, will do the job if you don't have the tool shown in Fig. 31. Once the nut is removed (don't forget to unlock the tab washer first), pull the hub off the shaft, noting that there is a washer behind it. Also behind it you'll see where the clutch springs each screw into a thread into the base of the hub. If you're fitting new ones, make sure the springs don't protrude past the rear face of the hub (Fig. 32): if they do, they will drag against the clutch basket.

The basket will now slide off the shaft—note the anti-rattle spring behind it (Fig. 33). There is one other clutch component that you cannot see—the clutch push rod which is fitted down the centre of the countershaft. This can be removed by

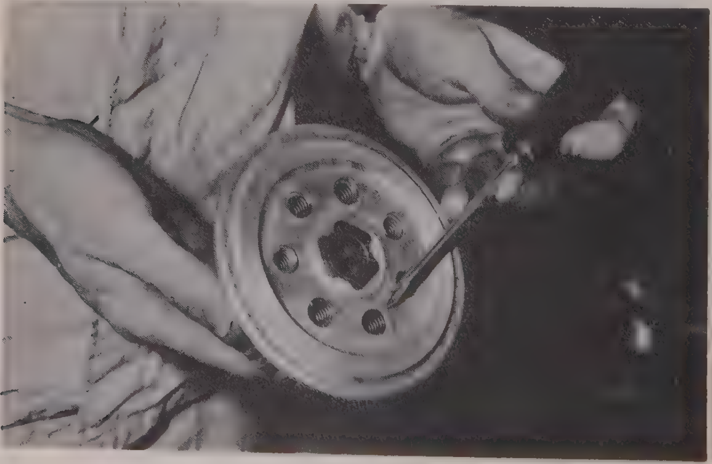


Fig. 32

Fig. 33

tilting the engine—note that the rounded end of the rod is at the opposite end to the clutch.

Before dismantling any further, take a long look at Fig. 34, which shows the gear-selector levers as they should look when correctly fitted.

Begin dismantling by removing the centre screw and lifting the top of the gear-selector cam (Fig. 35). Under it there are five pins—four long ones and a short one. Note their positions—particularly that of the pin with the flat on it, which goes at the bottom and aligns with the centre of the positive stop wheel.

Check that the gearbox is in neutral—the sprocket should not move when the cogs are rotated—then remove the 'E' clip and pull the cam locking plate off its pin (Fig. 36). The positive

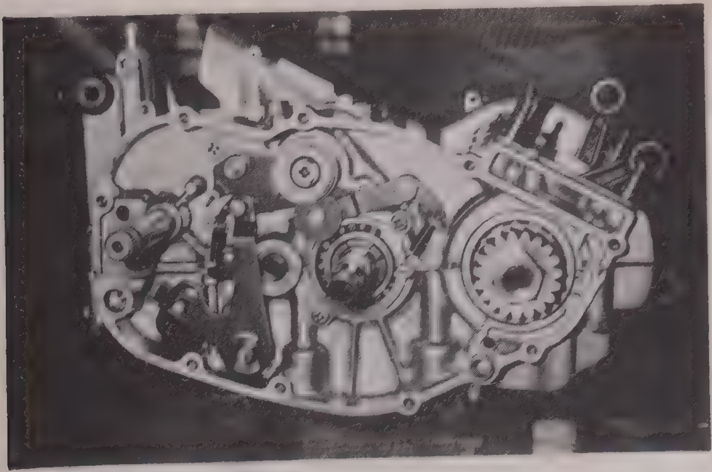


Fig. 34

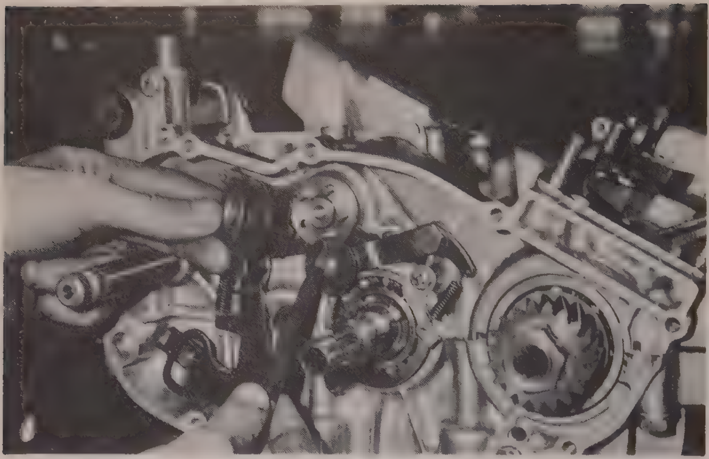


Fig. 35

stop lever, complete with tensioning spring, comes off next (Fig. 37). Note the washer behind the pivot bolt.

We can now take out the selector shaft. Press down on the spring-loaded plate and tap the shaft out with a block of wood from the splined end (Fig. 38). The hairpin-type spring that centralizes the lever is *not* symmetrical, so if you take it off the shaft, mark which way round it fits first. Unscrew the plate retaining the countershaft bearing. We're now almost ready to split the two halves of the crankcase.

On the underside of the crankcase, a plate covers the clutch lever. Undo its 8-mm fixing screws, then disconnect the cable and remove the lever from its spindle (Fig. 39).

Seventeen bolts with 10-mm and 12-mm hexagon heads secure the crankcase halves together—five on top and twelve

Fig. 36

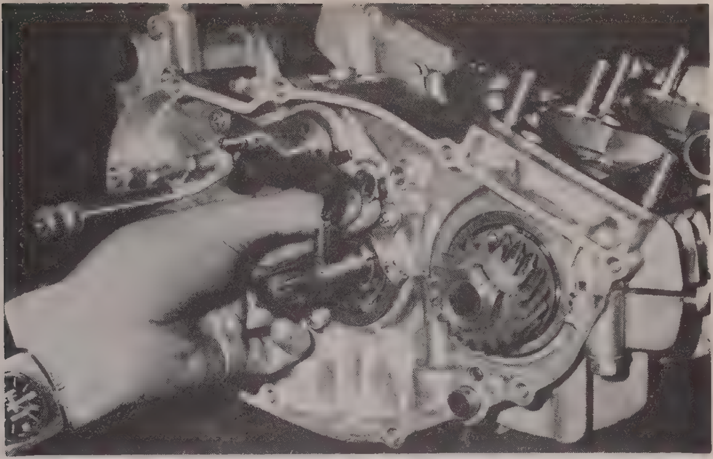


Fig. 37

underneath. Figure 40 shows where they are; the figures round the outside of Fig. 40 show the size and length of each bolt. For instance, 8 × 45 indicates a bolt with a thread diameter of 8 mm and a length of 45 mm. On the crankcase you will find the bolts numbered 1 to 17, indicating the order in which they should be tightened. For 6-mm diameter bolts, the tightening torque is 4·4/7·3 ft-lb, and for 8-mm bolts 9·5/17 ft-lb. Bolts numbered 7, 8 and 9 on the lower crankcase have flat aluminium washers under the heads—don't omit these, otherwise transmission oil will leak out.

Undo the bolts and the upper half can be lifted clear, leaving the crankshaft and transmission assembly in the bottom half (Fig. 41).

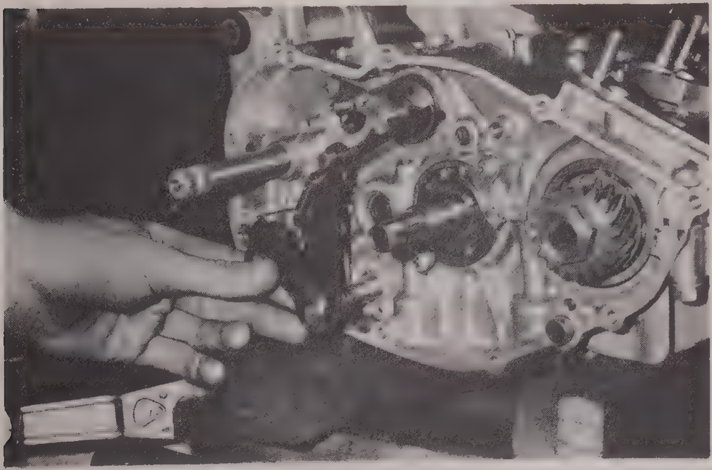


Fig. 38

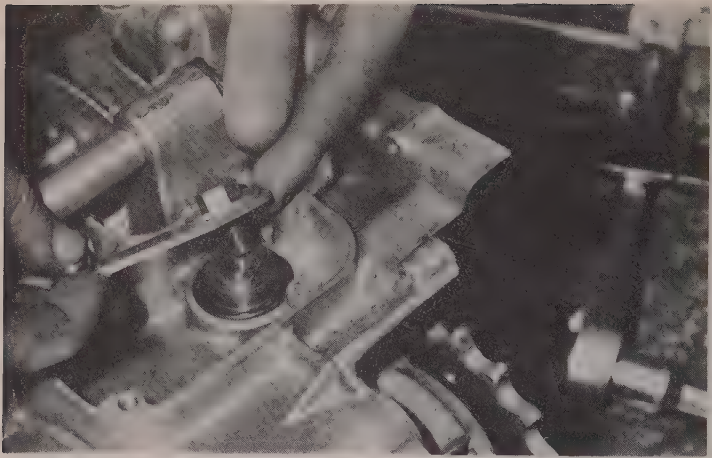


Fig. 39

The way the gears mesh together is shown in Fig. 42. From the top, the crankshaft, countershaft, drive shaft and kickstart shaft are shown.

Lift out the countershaft first. You will see that the right-hand bearing outer race is prevented from turning by a roll pin which protrudes from it and sits in a groove in the casting (Fig. 43). Damage to the gears on the countershaft is best cured by fitting a complete assembly—the bulk of the cluster is assembled using a 9-ton press.

You can, however, slide the bearing and kickstart pinion along the shaft. Under the pinion is a split needle roller bearing which comes apart in two halves (Fig. 44). On re-assembly, make sure the tapered ends of the roller cages face the nearest end of the shaft.

Behind the kickstart gear are three washers—two plain

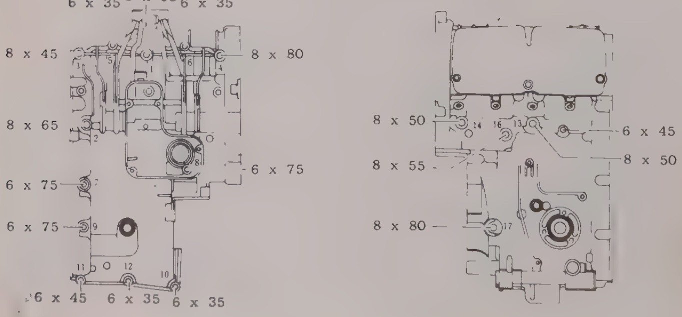


Fig. 40

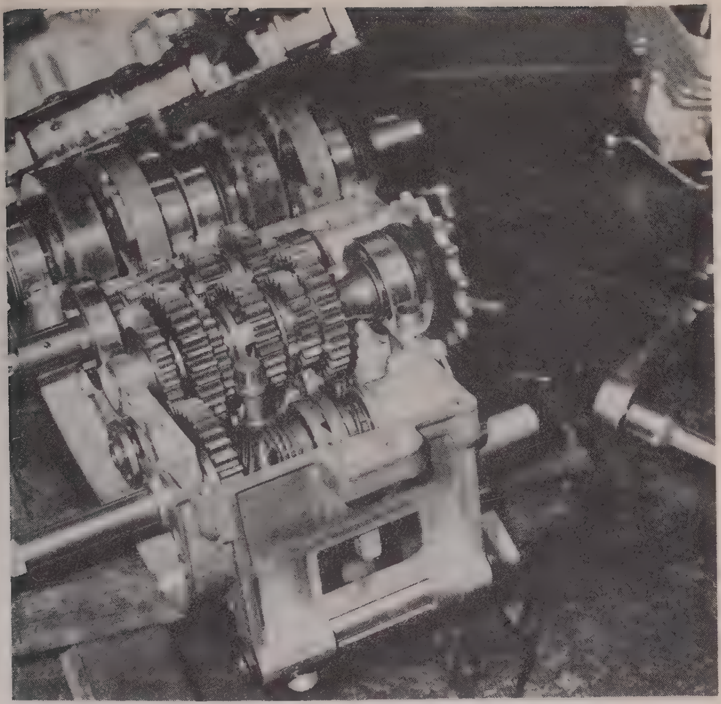


Fig. 41

ones and, sandwiched between them, a roller-bearing thrust washer (Fig. 45).

The drive shaft lifts out like the countershaft, but the gears can be dismantled because they are retained by circlips. Figure 46 shows the order in which the gears are assembled and the position of all the circlips and the sizes and location of various washers in the gearbox. The figures indicate the inside and outside diameters of the washers and their thickness.

The kickstart assembly comes out after undoing a plate securing the squared end of the alloy kickstart bush, and easing the bush from its housing (Fig. 47). The bush has a transverse hole which aligns with a similar hole in the housing—these must match up on re-assembly.

Pull out the kickstart shaft (Fig. 48) and the kickstart gear can be lifted out, disengaging the worm drive from the oil-pump pinion (Fig. 49). The oil-pump drive gear simply lifts out of its bearing in the gear case.

Note the position of the ratchet wheel in relation to the kickstart shaft (Fig. 50). There are two adjacent punch marks on wheel and shaft which must be aligned on re-fitting. The order in which the components go together is shown in Fig. 51. After it has been refitted, the shaft must be re-tensioned by the coil spring. Do this by turning the splined end clockwise as far as possible, then using pliers turn the spring anti-

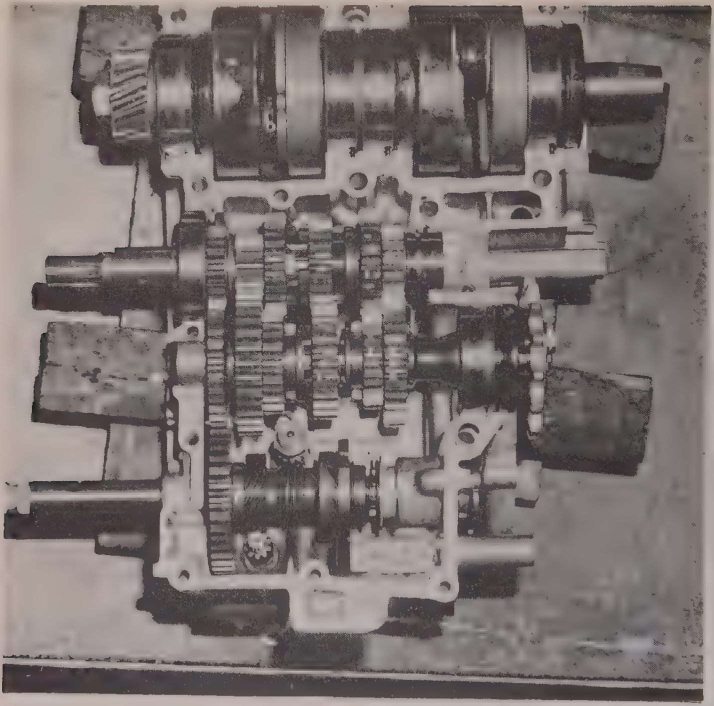


Fig. 42

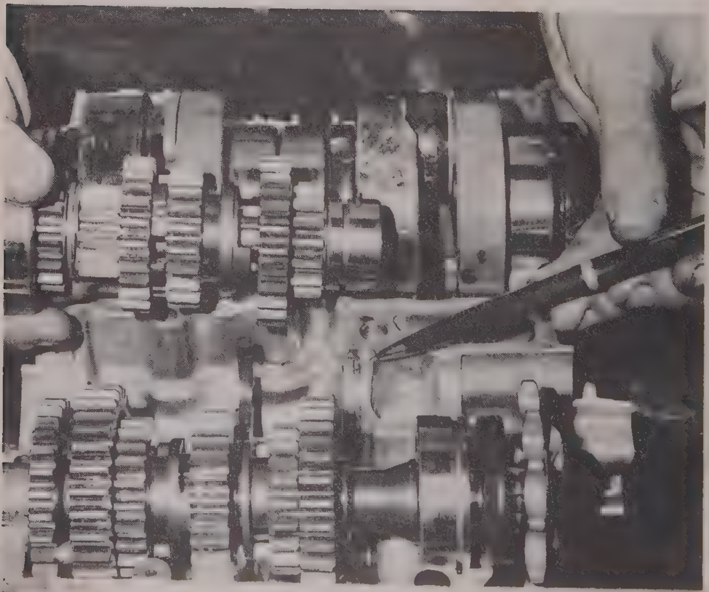


Fig. 43

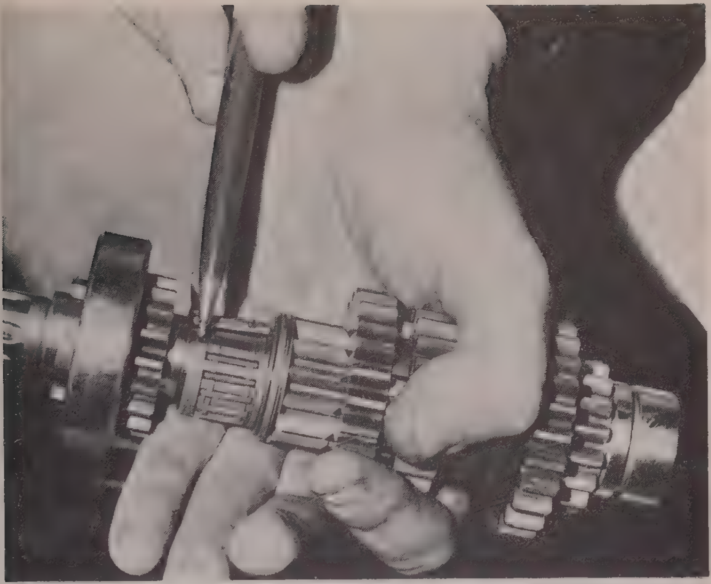


Fig. 44

clockwise until the end can be inserted into the cross-drilling in the shaft.

If you have been troubled by poor gear engagement, check the engagement dogs and the mating gearwheel slots by half engaging them and twisting the wheels against each other (Fig. 52). If the dogs are worn the wheels will slide apart as you apply pressure; if they stay firmly in contact even with the tips of the dog teeth in contact, then all's well.

The other cause of poor gear selection is the selector mechanism itself. The fifth gear selector fork is carried on a

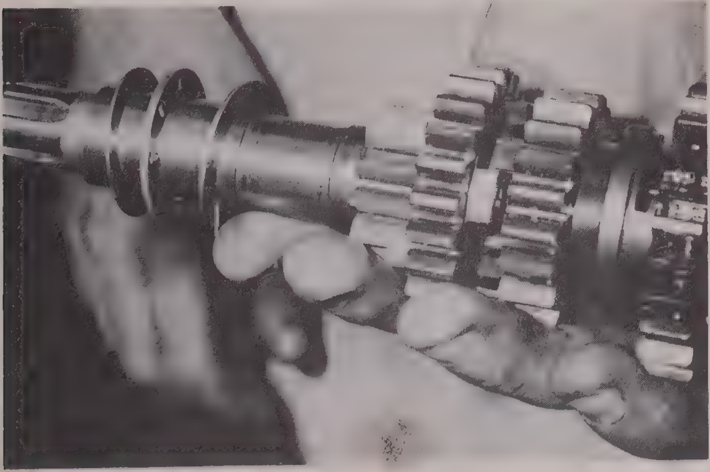


Fig. 45

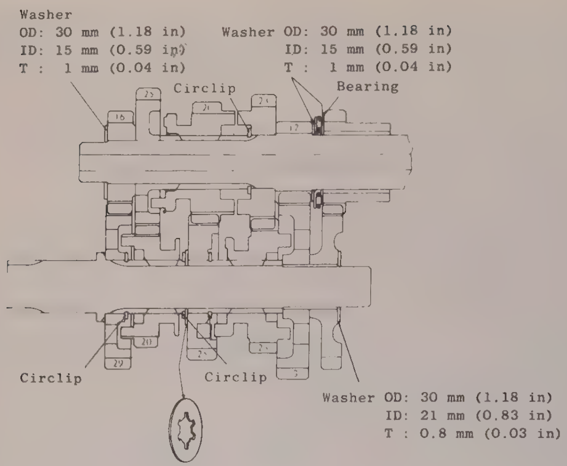


Fig. 46

separate shaft, located in the crankcase by two 'E' clips. Prise these out, grip the shaft with pliers and tap the pliers with a small hammer to extract the shaft from the crankshaft pinion side. The selector fork has a pin and roller (Fig. 53) which engages with the centre slot of the gearshift drum. The roller is a sliding fit, so make sure it isn't lost as the selector is taken out.

The 1–2 and 3–4 selectors are on the drum in the bottom of the crankcase (Fig. 54). Use long-nosed pliers to remove the split-pins, then take out the selector pins and rollers to disengage the selectors from the drum.

Unhook the spring and move the neutral positive stop out of the way, remove the neutral switch, and slide the drum out.

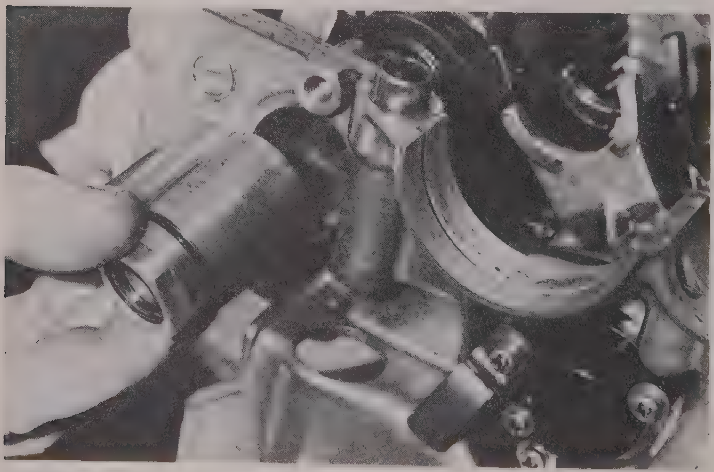


Fig. 47

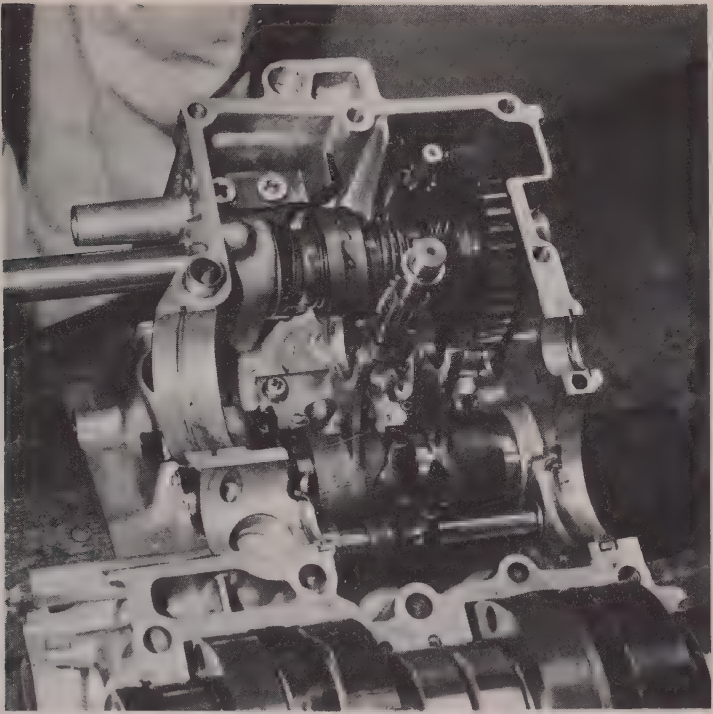


Fig. 48

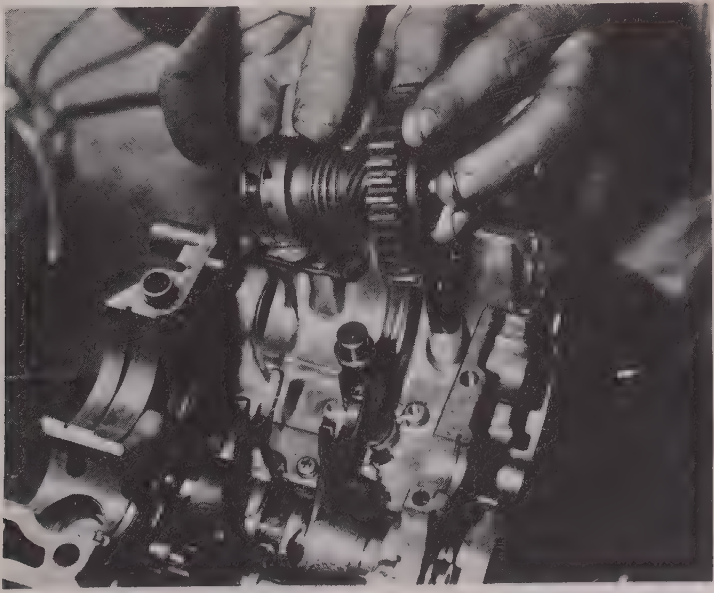


Fig. 49

Fig. 50

The drum and its two selectors is shown in Fig. 55. The selectors should be re-assembled on the drum as shown, with the forks biased towards the centre.

Check each selector fork in the appropriate groove in the gear cluster and measure the free play (Fig. 56) which should be 0·8 to 1·2 mm.

The crankshaft is more or less a sealed unit in that you cannot split it without a substantial press, and the same sort of equipment is needed to re-unite it. If you take it out, make sure the small roll pins (Fig. 57) that locate the bearings engage with the cut-outs in the casting when refitting.

The crankcase joint faces must be cleaned and smeared with a non-hardening jointing compound to prevent leakage—Suzuki recommend their liquid gasket, part No. 99000-31010. Fit all the bolts and tighten them in the order shown on the crankcase—see Fig. 40.

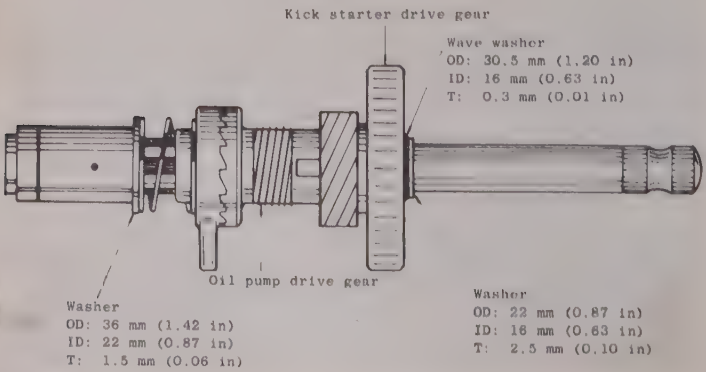


Fig. 51

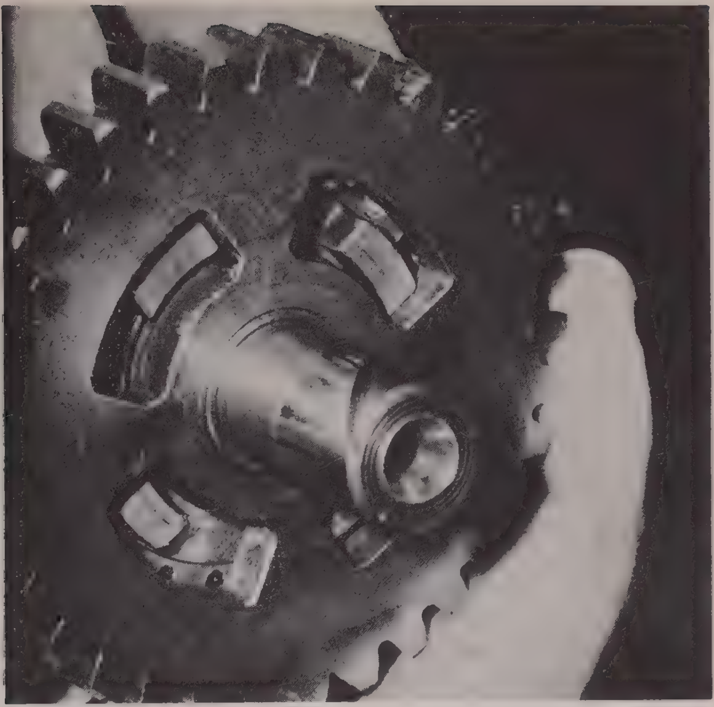


Fig. 52

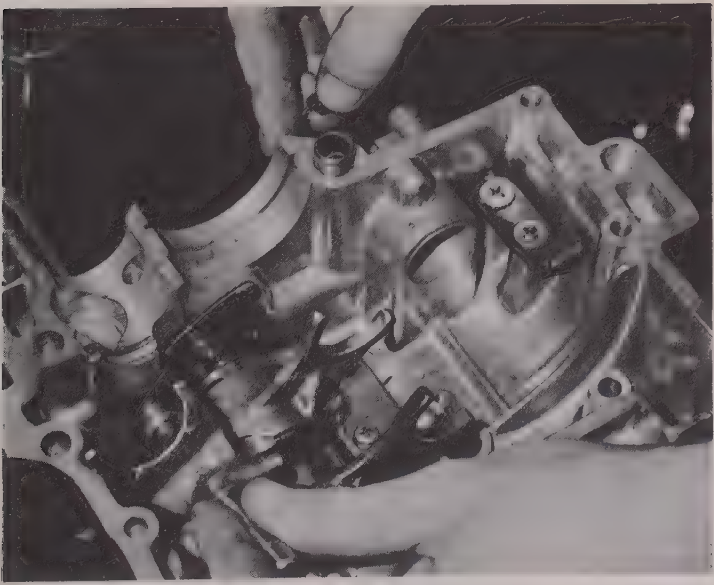


Fig. 53

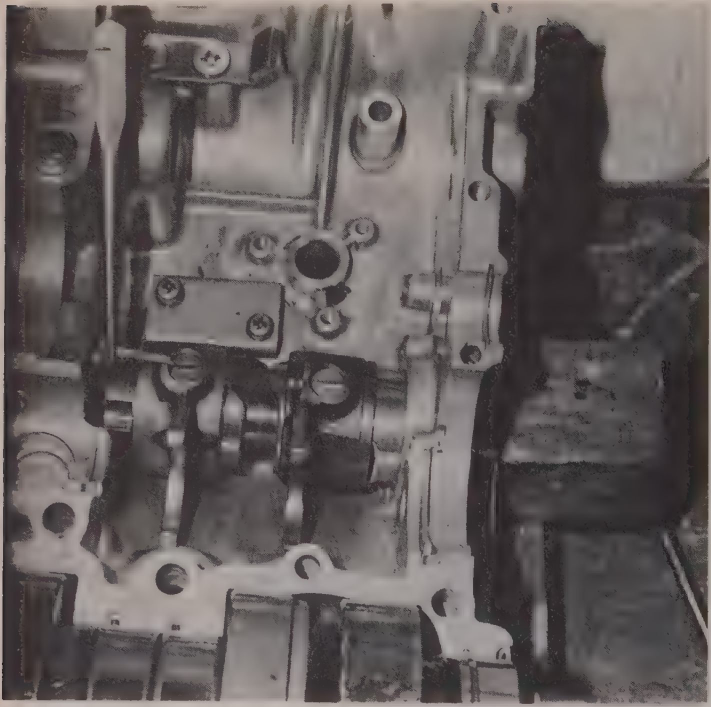


Fig. 54

Oil the clutch plates on re-assembly, and use an oil can to pump oil into all the oil pipes before tightening the unions. Any remaining bubbles can be removed when the engine is first started by running it at 2000 rpm and holding the oil-pump lever fully open. This will, of course, inject an over-generous quantity of oil into the crankcase, but a temporary stream of smoke from the exhausts is a small price to pay for

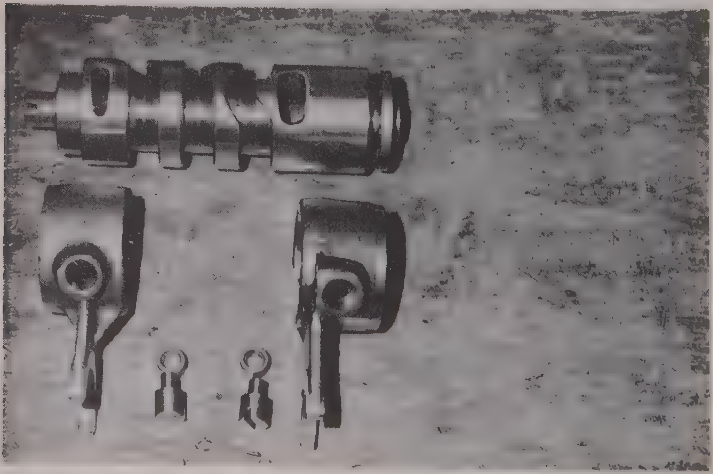


Fig. 55

Fig. 56

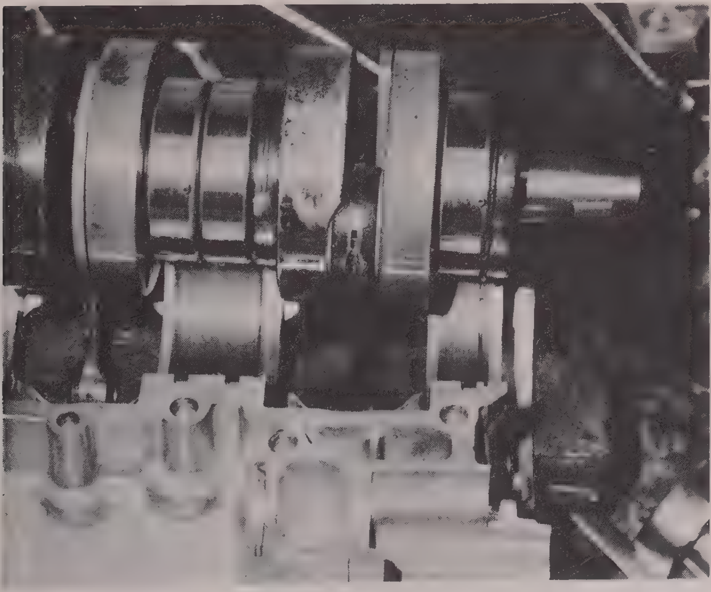


Fig. 57

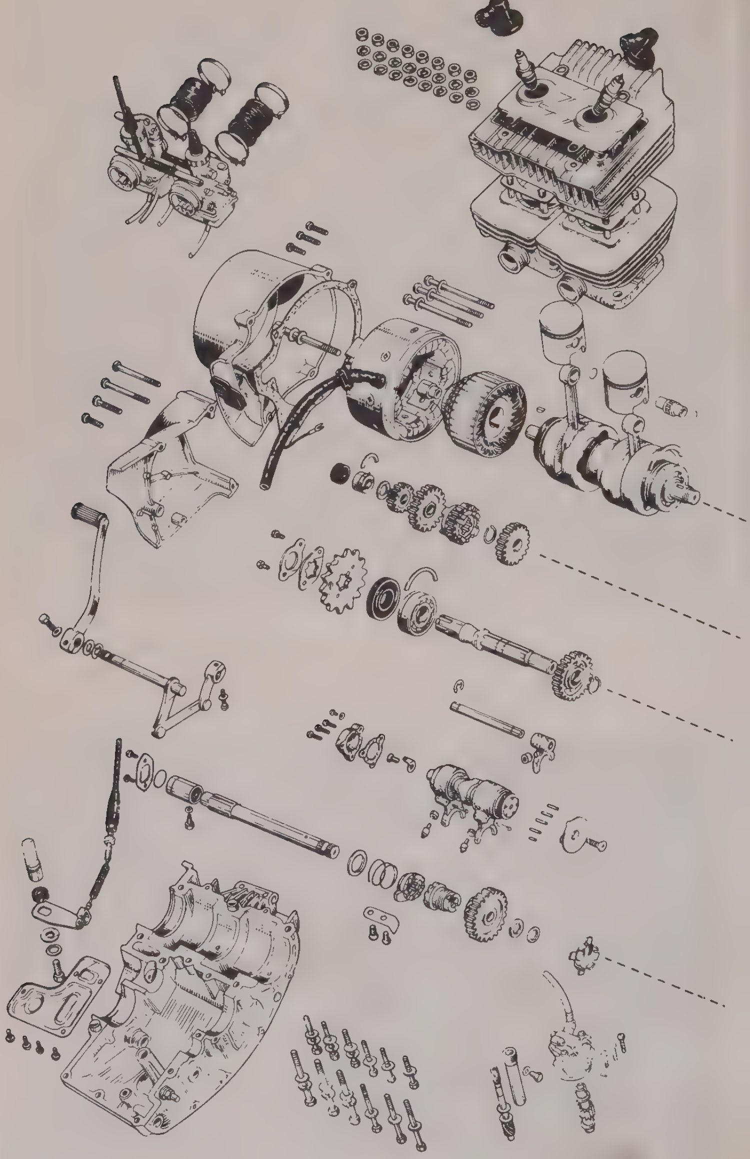
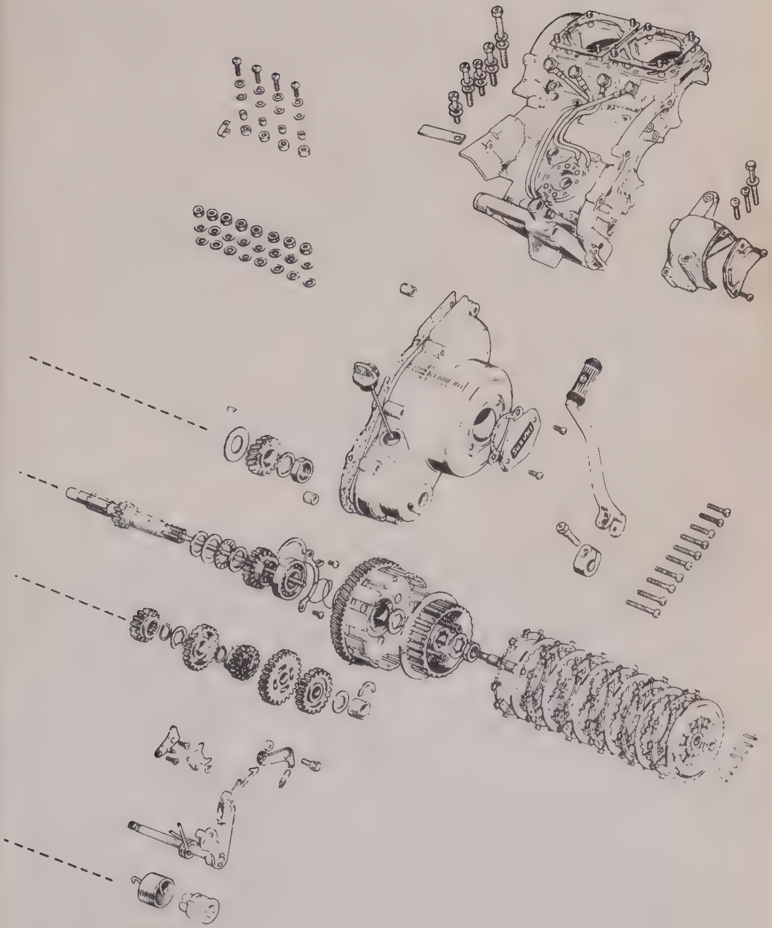


Fig. 58



the knowledge that the engine lubrication system is working correctly. Incidentally, some owners blame lubrication problems on the assumption that the oil-tank filler cap seems to have no air hole in the lid. In fact the cap breathes through the threads.

An exploded view of the engine is shown in Fig. 58.

Operation 5: Air filter and carburettors

A single screw secures the polyurethane foam elements in the air cleaner. The elements are of the oil-wetted type, and at 3000-mile intervals they should be taken off their carrier (Fig. 59) and washed in petrol to remove the dirt. After washing,

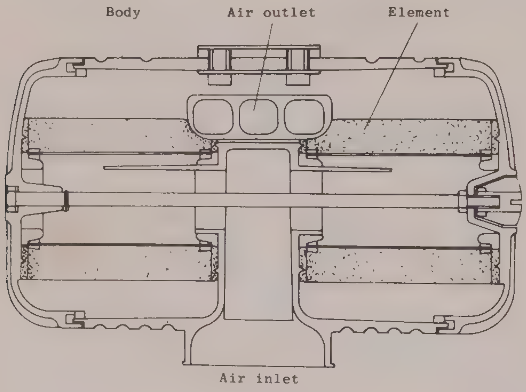


Fig. 59

squeeze or press the foam (don't twist or wring it) to remove surplus petrol, then wet it with SAE 30 oil, squeezing out the surplus, before refitting the elements.

To clean the carburettors, remove them from the engine (see 'Engine Removal'), unscrew the top knurled cap from each mixing chamber, and draw the throttle slide and needle upwards out of the carburettor body.

If you want to check the needles, the cable can be detached from the slide by compressing the coil spring and disengaging the cable end from the fixing hole. Once the cable is free, the spring can be taken out, followed by the 'W' spring which sits in the base of the slide and traps the needle in position. You can now push the needle upwards. If it's not obviously bent or suffering from surface damage, it is most likely satisfactory, but check that the 'C' clip is engaged with the centre of the five notches before re-fitting it. Carburettor components are shown in Fig. 60.

Undo the screws securing the float chamber and remove it. You'll see that the concentric float is hinged and operates the float valve by a small tag.

You can make a rough check of float valve efficiency by blowing down the fuel pipe and holding the float up so that it lightly shuts the valve; this should block off the flow of air completely.

If the valve is working properly, check the float level by inverting the carburettor body so the float rests on the valve,

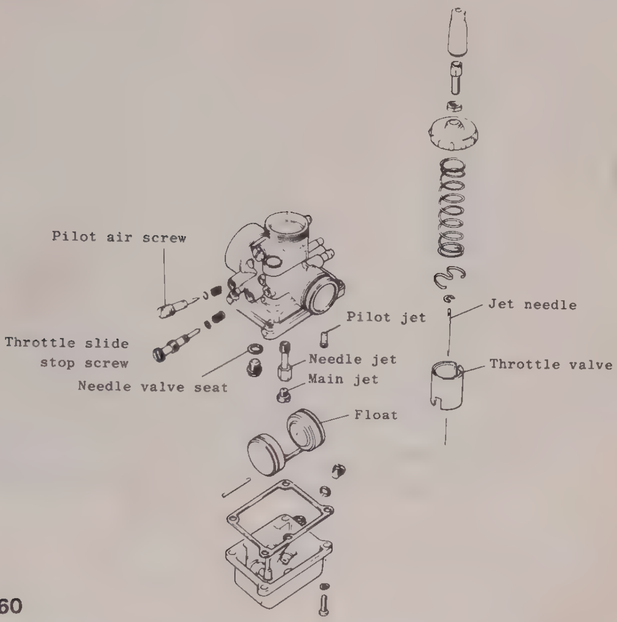


Fig. 60

and measuring the distance from the bottom of the float to the float bowl face (Fig. 61), which should be 19.9 mm. At the same time, the jets in the base of the carburettor should be removed and blown clear using a tyre pump.

The left-hand carburettor incorporates a starter plunger which is raised to supply a rich mixture to both carburettors during cold starts. A short flexible pipe carries the rich mix from the starter unit to the right-hand carburettor. The plunger can be removed for inspection after unbolting the pivot point of the lever arm on the carburettor casting.

One of the peculiarities of the GT Suzukis is a petrol tap on the tank which does not have an 'off' position. The tap contains a diaphragm, sensitive to the vacuum within the right-hand carburettor, and will not permit fuel to flow until the engine has started. This avoids flooding but can lead to confusion if you do not mark the pipes (there are three) connecting the carburettors to the tank tap. The vacuum pipe is, in fact, the longest one on the right-hand carburettor and goes on the brass stub pipe on the tap. The other two petrol tap stubs are connected to the two fuel pipes—one to each carburettor.

When starting the engine for the first time after carburettor

Fig. 61

cleaning, the float chambers can be filled if the tap is set to the 'prime' position. Once the engine has started, move the tap to the 'on' position.

To adjust the carburettors, first set the throttle slides so that they open together (see 'Cable adjustment'). On each carburettor, turn each pilot air screw (Fig. 60) fully clockwise, then undo it one turn. Start the engine, if necessary holding a fast idle with the twistgrip, and allow the engine to warm up. Slowly turn the pilot air screw in or out to obtain the smoothest idling speed—it should not be necessary to move each screw more than a quarter-turn.

You now need a helper to open the throttle while you hold a hand close to the end of each exhaust silencer and check the gas flow. If one pipe is delivering more than the other, the throttle slide stop screw should be turned slowly clockwise on the carburettor feeding the weaker cylinder until both silencers produce an equal amount of exhaust when the throttle is opened. Throttle slide adjustment may affect the timing of the oil pump—recheck this after carburettor adjustment (see 'Oil pump setting').

Operation 6: Clutch adjustment

On the kickstart side of the engine there is a small plate in the

clutch cover. Removing this gives access to the end of the clutch release rod (Fig. 30) which should be adjusted as follows: Loosen the lock-nut and turn the centre screw until it *just* becomes stiff to turn. From this position, unscrew it half a turn. While holding the centre screw in this position, re-tighten the lock-nut.

Because of the design of the clutch lever, this form of clutch adjustment is rarely required—normally only after clutch dismantling and re-assembly. Suzuki recommend that running clutch adjustments are made at the two cable adjusters.

Operation 7: Final drive

There is no need to disturb the final drive sprocket or chain when removing the rear wheel, which comes off as follows: Remove the spring clip and nut securing the torque arm to the brake assembly (Fig. 62) and remove the brake operating rod at the rear brake lever after undoing the adjusting nut.

From the other side, remove the fixing clip from the castellated spindle nut and undo it—if necessary using something like a cross-head screwdriver through the spindle head on the other side to stop it turning. Unscrew the castellated nut and withdraw the spindle to free the rear wheel. Note that there is a spacer on the right-hand side between the hub and trailing arm; this must be removed before the wheel can be disengaged from the cush drive and taken out.

For cleaning and checking, the brake assembly is simply lifted out of the drum (Fig. 63). On the other side of the wheel, the cush-drive rubbers sit in recesses in the hub and worn ones will show obvious signs of weakness—fretting and cracking.

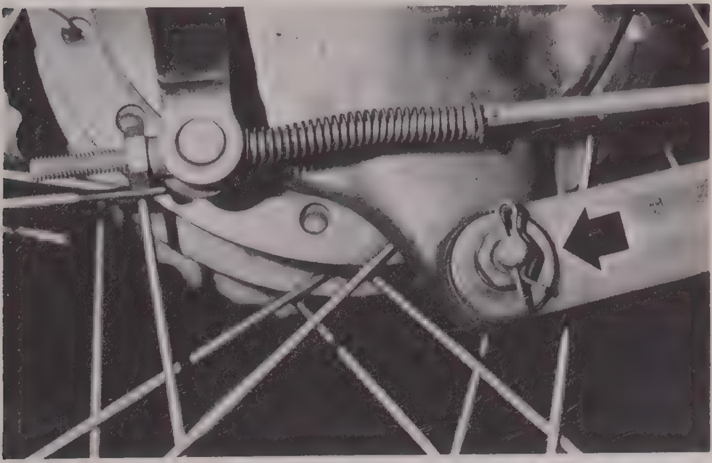


Fig. 62

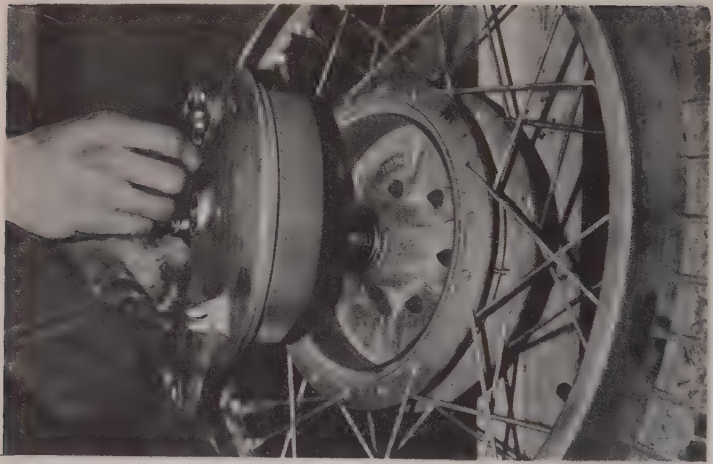


Fig. 63

Wheel bearings are the usual drive fit on to registers in the hub, and have a distance piece between them. With the wheel off the machine, they can be checked for roughness by inserting the spindle, resting the free end on the bench so that the wheel is supported vertically, and turning the wheel slowly. Damaged bearings will betray themselves by excessive free play (you'll be able to waggle the spindle up and down in relation to the wheel), roughness, which will be felt as tight-spots as the wheel is rotated on the spindle, or rumbling noises as the wheel is rotated.

On both front and rear wheels, the bearings are driven out using a drift down the centre of the opposite bearing. Fit new ones after working grease into the races, and after fitting the first one, give the bore of the hub a thin layer of grease before fitting the spacer and the opposite bearing. Always fit wheel bearings using a block of wood resting on the full diameter, and drive the bearing in squarely by hammering the timber. Oil seals fit with their lipped section towards the bearing. Don't pack too much grease into the hub, by the way—leave a good air space for it to expand when it gets hot, otherwise it will melt on to the brake linings.

Operation 8: Chain adjustment

This is quite straight-forward: remove the split pin and loosen the rear wheel spindle castellated nut. Also loosen the larger sprocket nut immediately behind it. The wheel will now be free to slide in the adjuster slots. Loosen the lock-nut, and tighten each of the adjusting bolts (Fig. 64) an equal amount to draw the wheel rearwards, and tighten the chain. Adjustment is correct when the maximum total sag on the bottom run of the chain is 15–20 mm with the machine unmounted.

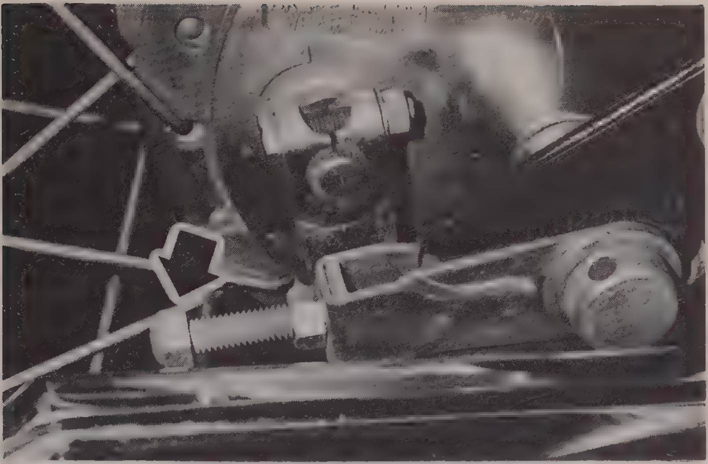


Fig. 64

Operation 9: Front forks

As with most telescopic units, the front forks need the occasional oil change. Each fork holds 125 cc of SAE 10W/30 oil. To drain out the old oil, remove the small cross-head screw at the base of each fork leg (Fig. 65). Work the forks up and down to force all the old fluid out. Once it's drained, at the top, remove the plug to top up each leg.

To adjust the steering-head bearings, loosen the clamp bolt, the front-fork upper pinch bolts, then use a C-spanner on the adjuster ring immediately below it (Fig. 66). Turning the ring clockwise when viewed from above tightens the bearings, rotating it anti-clockwise loosens them. The steering head is correctly adjusted when there is no free play (check by rocking the machine backwards and forwards with

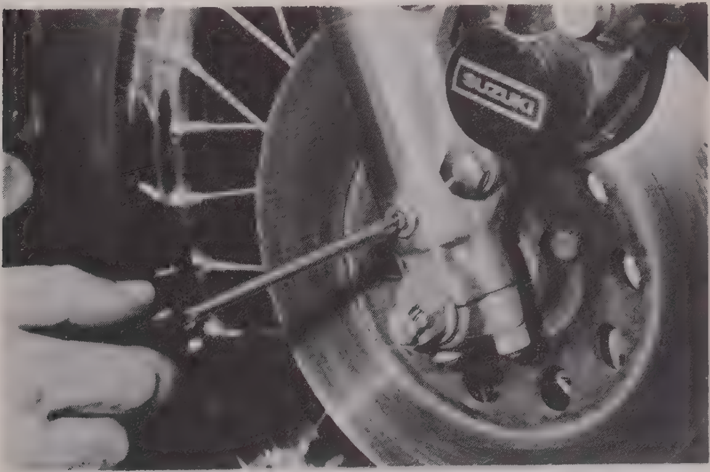


Fig. 65

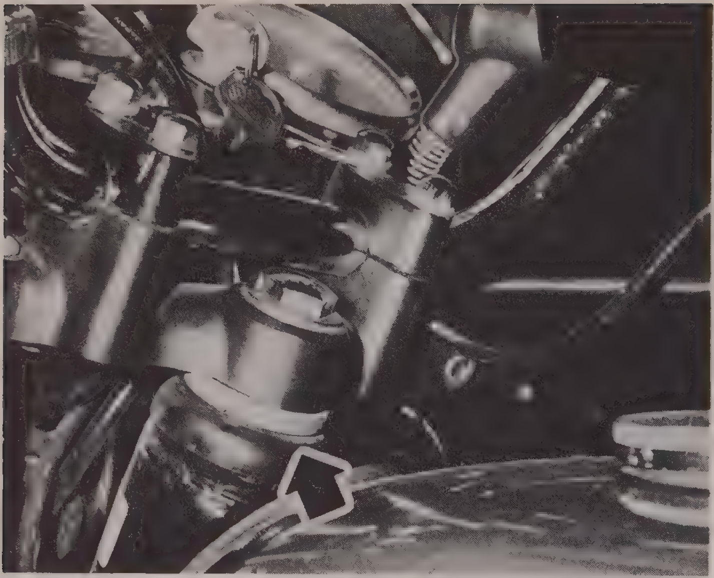


Fig. 66

the front brake applied and feel for movement at the steering head) and the handlebars move easily from lock-to-lock when the machine is on its stand with the front wheel off the ground.

Operation 10: Brakes

Suzuki use a calliper on the front wheel that slides on two axle bolts. The pads can be changed without removing the front wheel if the calliper is split as follows.

Use an Allen key to remove the two axle bolts (Fig. 67).

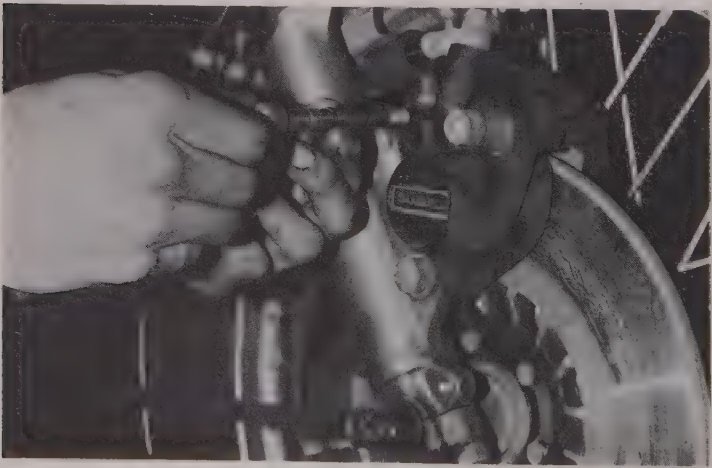


Fig. 67

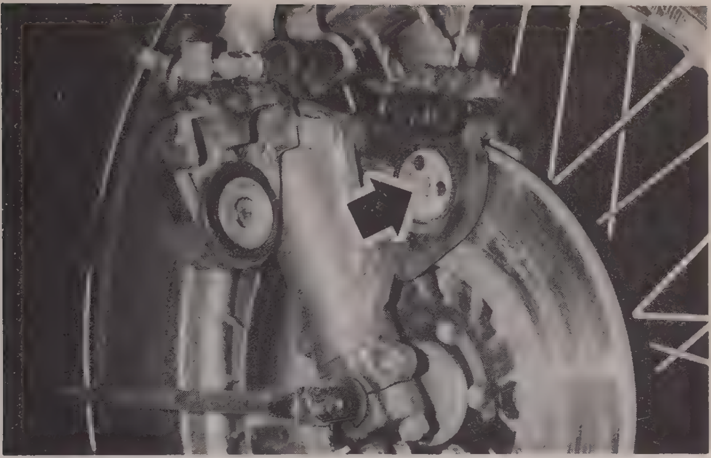


Fig. 68

Once these are clear, the outer section of the calliper carrying the piston can be swung out of the way. The outboard pad will be in an aperture in the fixed centre section of the calliper (arrowed, Fig. 68).

Lift out the inboard section of the calliper from the wheel side of the disc (Fig. 69). It contains the fixed pad, which is located in the recess in the casting by a dowel (Fig. 70). The pad lifts out.

The outer (moving) pad cannot be removed until the fixed centre of the calliper is unbolted from the fork stanchion. Remove the two bolts (Fig. 71), free the centre, and push out the pad towards the disc.

The circular pads have a groove and red line round the outer edge which denotes the wear limit (arrowed, Fig. 72), and the pads should be renewed before the friction material

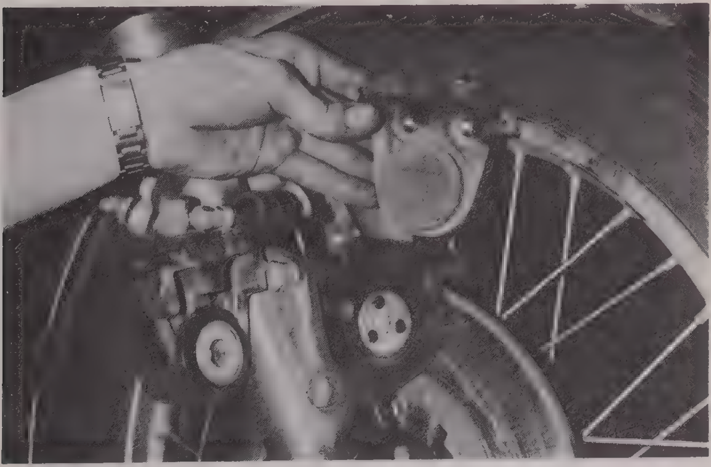


Fig. 69

Fig. 70

reaches this point. On re-assembly, the backing plate and the side of the pad between the red line and the backing plate should be lightly smeared with Suzuki Brake Pad Grease (Fig. 72). Before refitting the outboard pad, clean the end of the piston, and if new pads are being fitted, remove the lid of the master cylinder and push the piston back into its bore to make room for the new, thicker pads.

Re-assembly is a reversal of the dismantling procedure, but before re-building the calliper, check the condition of the dust seals that shroud the axles, and lubricate the two axle bolts with Suzuki Rubber Lubricant. The 'O' rings on the axles (Fig. 73) should be in good condition. After re-assembly, operate the brake two or three times to bring the pads up to the disc.

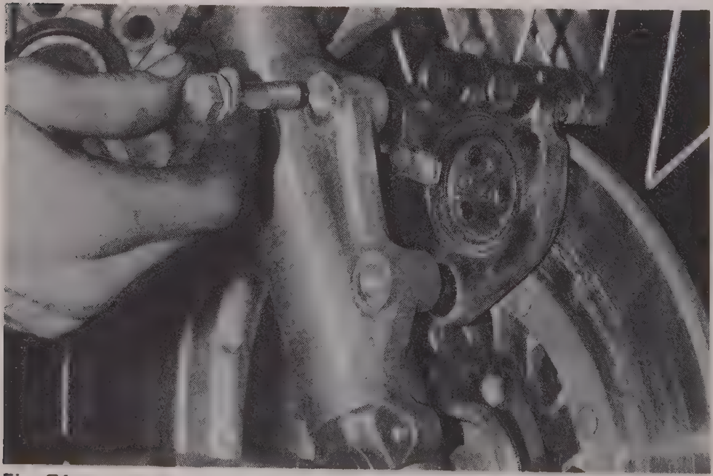


Fig. 71

Fig. 72

It is not necessary to take apart any of the hydraulic system to change the pads, but if, for any reason, the hydraulic line between the master cylinder and calliper is opened to the atmosphere, the air which inevitably gets into the system must be bled out as follows:

Remove the rubber dust cap from the bleed screw on top of the calliper and attach a length of clear plastic tube to the screw; immerse the free end of the tube in a glass jar with a little brake fluid in it.

Remove the lid and diaphragm from the master cylinder on the handlebar, and top it up with the recommended brake fluid. This fluid must be fresh and unused—brake fluid should never be re-used as it absorbs water which can cause brake failure under arduous conditions.

Unscrew the bleed screw half a turn and squeeze the brake

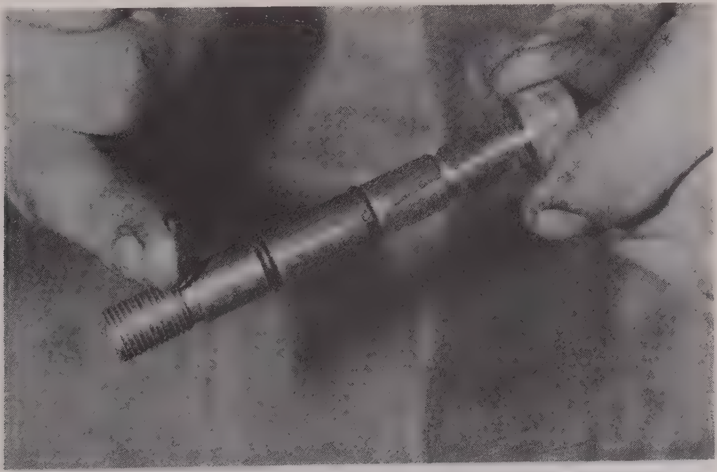


Fig. 73

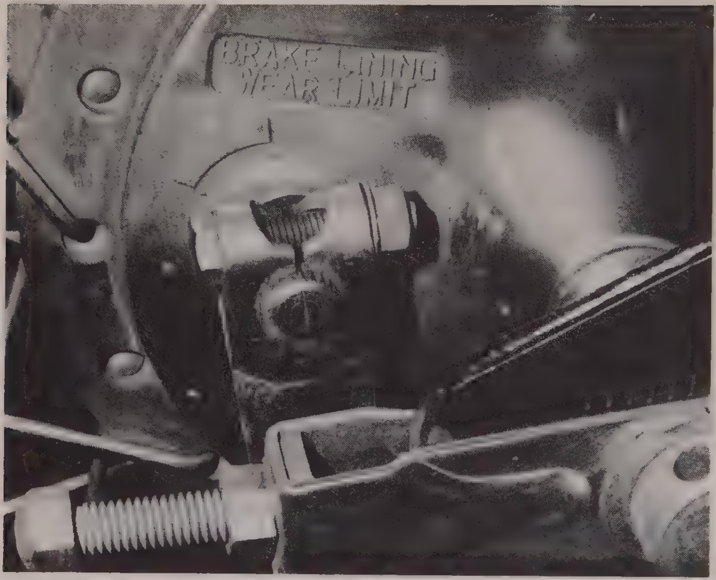


Fig. 74

lever. Fluid will pass down the plastic pipe and, if there is air in the system, you will see bubbles in the fluid.

When the lever touches the handlebar, close the bleed screw before releasing it. Repeat the operation until fluid emerging from the tube is free from air. Keep an eye on the level in the master cylinder, and if it drops below the half-way mark, top it up, as air in the master cylinder will mean you must start the whole operation again.

Once the system is free from air, close the bleed screw (there's no need to use a great deal of force—just 'nip' it up tight) and replace the rubber cover. Top up the master

Fig. 75

cylinder to the recommended level and replace the diaphragm and lid. Check the action of the brake, which should have a firm feel to it with no trace of sponginess.

Incidentally, keep brake fluid away from the paint—it is an effective paint remover.

The rear brake has a wear indicator built into the brake cam spindle and backplate. A line scribed on the end of the spindle (Fig. 74) must not go beyond the end of the segment on the backplate with the brake fully applied. If it does, the shoes are worn and must be renewed.

To renovate the rear brakes, remove the old shoes and linings and fit relined shoes. The old shoes come out by pulling them outwards together, against the tension of their springs, so that they clear the pivots (Fig. 75).

Before fitting new shoes, check the action of the cam. If it is stiff or seems dry, the cam can be removed for greasing after taking the brake lever off the splines. Before doing this, mark the position of the lever on the cam with two dabs of paint—it's important it is replaced in exactly the same position, otherwise the brake-wear indicator will give a false reading. After marking the components, remove the pinch bolt, pull the lever off the splines, and remove the cam from the backplate from the brake-shoe side. Clean the bearing surfaces with petrol or paraffin, lightly apply high melting point grease, and refit the cam and lever.

Fit new shoes after linking them together with the pull-off springs transferred from the old shoes. A small dab of high melting point grease on the shoe tips will discourage any brake squeal.

5 You're the doctor

If you are ill, you expect your doctor to diagnose the trouble and prescribe a cure. He does it by noting all the symptoms until he has built up an overall picture of the ailment; which means, of course, that he won't be treating you for appendicitis if what you actually have is athlete's foot!

When it's your motorcycle that's off tune, *you* are the doctor and it's up to you to make the same type of diagnosis. There is nothing to be gained by disturbing the timing if the fault eventually turns out to be seized rings, so adopt just the same methodical approach that the doctor uses and you will save both time and money.

If certain requirements are being fulfilled then the engine *must* work. If it is not, then it follows that one—or more—of these requirements is not being met, and fault tracing boils down to discovering which it is, and why it is not.

An engine *must* work if the correct charge of fuel-air mixture is being induced into the crankcase, transferred to the cylinder, properly compressed, fired at the right moment, and the residue properly exhausted. Only an obvious mechanical failure could otherwise stop the unit from firing.

Consequently, fault tracing should always begin with an investigation into these five main requirements, and logically it would start with checking the petrol supply by peering into the tank to see that, in fact, there is a supply of fuel available. The next step should then be the equally obvious one of checking that the fuel is turned on and, if the tank level is low, that it is turned to the reserve position.

Once assured that the tank does contain fuel and that the tap is correctly set, the next check on the list is to ascertain whether or not the fuel is reaching the carburettor, by turning the tap to the 'prime' position, and removing each pipe for an instant from the carburettor.

Normally, this initial check will have taken only a minute or so to carry out, but it will have given one of two quite definite answers. Either fuel is reaching the carburettor, or it is not. If it is not, then you have found at least a contributory cause of the trouble and this should be rectified before proceeding. If it is reaching the carburettor, you can pass on to the next stage which, with a two-stroke, must always be to check the sparking plugs.

Where inspection shows the sparking plugs to be clean and the gaps correct, connect the plug to the HT lead and place its metal body in contact with the cylinder. Arrange matters so that you can easily see the gap while operating the kickstarter, and then turn the motor over smartly. A good fat spark should jump across the plug points.

A point here, though, is that if the plug was wet it could mean that the carburettor had flooded or the air filter choked. Check this: then clear the engine before going further by turning off the petrol, opening the throttle wide, and kicking the engine over a dozen times or so to blow out the over-rich mixture. Find and rectify the cause of the flooding and dry out the plug by burning off the raw petrol in the flame of a match or a cigarette lighter.

Repeat the check several times and, if no spark is obtained, substitute brand-new plugs—an essential 'spare' which should always be carried—and try again. If the new plugs spark and the old ones didn't, the obvious inference is that the plug insulation has broken down and fitting the new plugs should cure the trouble.

If no spark is obtained with the new plugs, however, then the trouble lies somewhere between the sparking-plug terminals and the coil, and a more exhaustive examination will have to be made.

Examine the HT lead minutely throughout its length, checking the terminals and inspecting the insulation for signs of cracks or perished areas which could cause tracking. Then check all the electrical connections on the HT and LT side.

Finally, remove the inspection plate and take a look at the contact-breaker points; open them fully and see if they are worn or dirty. Clean them and then open the points fully again and check the gap with a feeler gauge. If all is apparently in order you have then done all that is possible on the electrical side, so far as roadside checking is concerned; a full ignition test is a garage job.

Complete engine failure for any other cause is unlikely, save in the remote event of all the piston rings being broken following a seizure. Other troubles are more likely to show themselves in reduced performance or in erratic running.

One of the likelier causes of a lack of pulling power, for instance, is loss of compression, and it is possible, where this is suspected, to deduce where the fault lies from the way the engine behaves. If the crankcase seals have failed there will be a tendency for the unit to spit back through the carburettor, since extra air will be induced into the crankcase, thus weakening the mixture. Where the head joint is fractured, a characteristic hissing noise may be heard as gas is driven through the gap. In both cases the unit will tend to run hot and this, in turn, aggravates the trouble.

Following a seizure, as we have noted, the rings may have

fractured or, on an engine which has not been decarbonized lately, they may have 'gummed up' in their grooves. This not only reduces both crankcase and cylinder compression, but it also allows oil to be driven from the case into the cylinder. This oil burns and the resulting smoke issuing from the tail pipe is a good clue to watch for, if at any time you have partially seized your engine and immediately afterwards it loses performance and begins to smoke, the only wise course is to stop immediately. The rings have almost certainly gone, and any further running could seriously damage the bore. This is especially the case where a ring has broken to form a sharp edge which will act as a highly efficient cutting tool; then the engine can be ruined.

One puzzling fault is pre-ignition. The engine 'pinks' continually—a metallic tinkling sound—and will even continue to run when the ignition is cut. This is often caused by carbon in the head becoming red hot and igniting the mixture before the spark occurs. The cure is to decarbonize as soon as you possibly can.

Exactly the same process of elimination has to be followed when tracing faults in the lighting system. Faced with electricity, of course, most laymen simply give it best first time but, in fact, electrical work is reasonably straightforward provided that magic word 'circuit' is borne in mind. Circuits are the key to electricity. If electricity is present and the circuit is complete then the current *must* flow through it; if electricity is present but is not flowing then it follows that the circuit is not complete.

Faulty circuits are of two types: the open-circuit and the short-circuit. In the first case there is a complete break and the wires on the side of the breakage remote from the electrical source are 'dead'. In the case of a short-circuit the current is still flowing, but is following a shorter path to earth, as would happen, for instance, if one end of a live lead had become detached from its terminal and had earthed itself on the bodywork.

Obviously, then, the first stage is to find out which wire is affected and, to do this, it is necessary to be able to read a wiring diagram (see Fig. 76). Such a diagram may at first sight appear disconcertingly like a plan of a railway marshalling yard, and oddly enough it is not at all a bad idea to think of it as such. The leads become railway lines, and the current the train which has to pass over them. Remember, though, that one important main line is not shown: this is the earth return, formed by the actual framework of the motorcycle itself. All the components are connected to this earth which, therefore, forms one complete half of the circuit.

When really complicated circuits are involved, it sometimes helps to trace them out individually, placing tracing paper over the wiring diagram and following the various lines

until you have a picture of the complete circuit with all its intermediate 'stations' marked.

Having found the circuit, the next job is to check it. First, obviously, you have to discover whether any current is flowing or not, and here a test rig helps immensely. One can be made quite simply with a bulb, a bulb-holder and a length

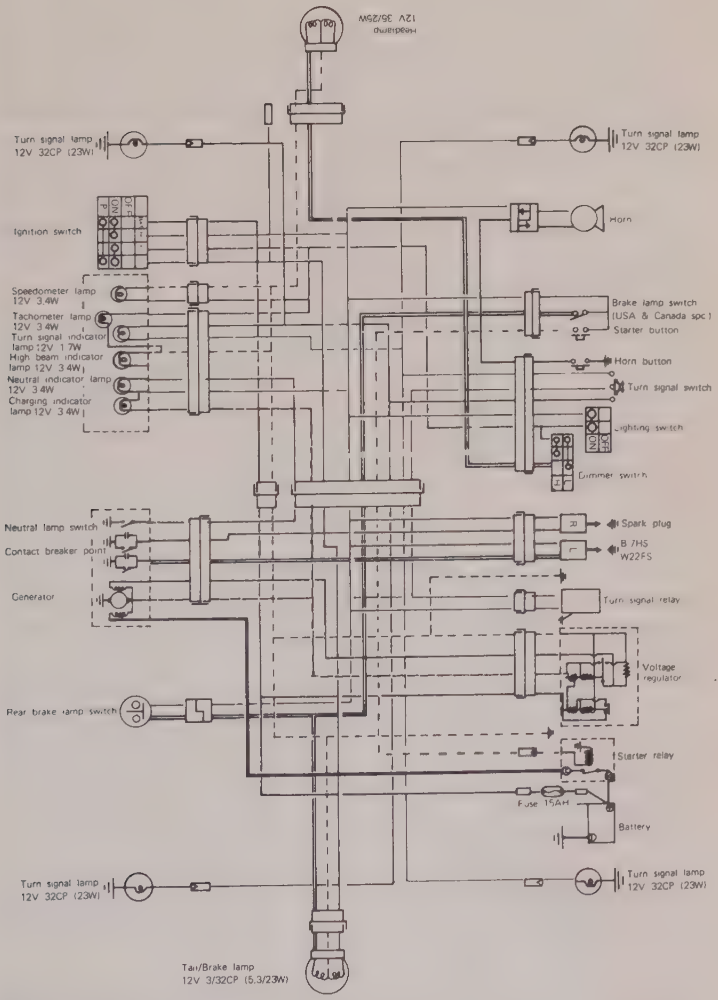


Fig. 76

of electrical lead. First, place the bulb-holder against one battery terminal, and then touch the other terminal with the end of the lead. The bulb should light; if not, it shows that the battery is flat and it will have to be re-charged before you can proceed. Never forget that a flat battery is more likely to be a symptom of the trouble than the cause; there is almost certainly a short-circuit somewhere which has caused the

battery to drain itself. It is possible for this to be a short-circuit inside the battery itself, so get the garage to check its condition at the same time as it is re-charged.

Once you are certain that the battery is all right you must check each individual lead in the circuit in question, a job made considerably easier by the fact that the wiring harnesses have wires of distinctive colours for each of the individual circuits.

Use the test lamp at each intermediate terminal to satisfy yourself that current is reaching it. When you come to one that is 'dead', you will know that the fault must be somewhere between that point and the last 'live' terminal. Inspect that section of wiring carefully to pinpoint the breakage. If it is a simple fracture you will find two loose ends. Sometimes a short-circuit can be detected by switching on and shaking the machine. As the broken end earths itself a characteristic crackling of electricity can be heard.

More difficult to locate is an internal fracture, where the insulation is undamaged. Garage men use a test rig fitted with a needle-sharp probe which can be pushed through the insulation at various points until a stage is reached at which the test bulb fails to light. This can, literally, pinpoint the position of the breakage. An alternative is to pull two ways on the lead, at intervals of about three inches, until a section is found which stretches under such treatment. This is the section in which the break has occurred.

Where the suspect lead is a very long one, or is inaccessible, a double check and a temporary repair can be made by connecting the two terminals with an external length of wire. Sometimes, a new lead can be drawn through the conduit by wiring it to the old lead and pulling it through with it.

When repairing fractured leads it is important to ensure that no undue electrical stresses are set up and that the insulation is made good. All joints should be twisted together as neatly as possible—it is even better if they can be soldered—and the new joint must be wound round with insulating tape to make leakage impossible. Any terminals which have been undone must be refitted tightly, and if a soldered joint has failed it *must* be resoldered; it is not sufficient merely to tape it up.

Given patience and a modicum of equipment, there is no reason why the average owner should not be able to trace most faults which can occur either in the engine or in the electrical system. Even when the nature of the failure is such that it is not possible to repair it oneself, it is often possible to provide a temporary cure, or at least to save money by giving the repairer an accurate diagnosis of the trouble.

6 Tracking down troubles

Engine will not start or is hard to start

Check	*Fault*	*Possible Causes*
Is enough fuel reaching the carburettor?	Insufficent fuel	1 No fuel in tank 2 Fuel pipe obstructed 3 Fuel tap blocked 4 Tank cap vent blocked
Remove the plugs and earth on the head. Operate the starter and check the spark	No spark produced, or only a weak one	1 Wrong grade plugs 2 Dirty plugs 3 Dirty contact-points 4 Points gap wrong 5 Plug gaps wrong 6 Faulty condenser 7 Faulty HT lead 8 Faulty HT coil
Operate kick starter to test compression	Poor compression or none at all	1 Starter not turning engine 2 Faulty head joint 3 Worn or broken rings 4 Damaged head/barrel/piston
Bump start the machine by pushing it in gear	Engine fires but will not run	1 Choke opened too much 2 Air correction screw too far open 3 Air leak in inlet pipe joint 4 Air leak—crankcase joints
Remove plugs once again and examine	Plugs wet	1 Carburettor is flooding 2 Too much choke

Lack of speed or pulling power

Check	*Fault*	*Possible Causes*
Lift and spin both wheels	Either does not turn easily	1 Brake is binding 2 Damaged wheel bearing 3 Hub needs greasing
Check the tyres with a pressure gauge	Tyre pressure are wrong	1 Punctured tyre 2 Faulty valve 3 Neglected maintenance

Check	*Fault*	*Possible Causes*
Engage first gear, apply the brakes and rev the engine	Engine still keeps running	1 Clutch is slipping—adjustment wrong 2 Clutch plates are worn
Slightly rev the engine in neutral	Engine does not speed up	1 Choke is closed 2 Air cleaner is clogged 3 Fuel line is clogged 4 Fuel cap vent blocked 5 Silencer is clogged 6 Main jet obstructed 7 Air leak in inlet pipe
Test the machine on good roads. Then check the ignition timing and points gap	Timing/gap wrong	1 Defective adjustment
Operate the kick-starter and test the compression	No compression	1 Rings and/or bore worn 2 Leaking joints
Strip and examine the carburettor	Carburettor is dirty	1 Dirt is blocking jets
Remove and examine the sparking plugs	Plugs dirty or discoloured	1 Plugs not properly cleaned 2 Plugs of the wrong grade
Does the engine overheat?	Engine overheats	1 Excess carbon in the combustion chamber 2 Excess carbon in the exhaust system 3 Clutch slips 4 Mixture is too weak
Test under high-speed acceleration	Engine pinks or knocks	1 Petrol of too low an octane rating 2 Piston, rings, and/or bore badly worn

Uneven running, mainly at low engine speeds

Check	*Fault*	*Possible Causes*
Verify the ignition	Timing incorrect	1 Improper adjustment
Re-adjust the air correction screw on the carburettor	Adjustment found to be defective	1 Mixture too weak 2 Mixture too rich
With engine running, spray petrol round the inlet and barrel joints	Engine speeds up	1 Faulty joints 2 Distorted faces on joints 3 Faulty mounting of carburettors

Check	Fault	Possible Causes
Remove each sparking plug, earth it on head, operate the starter and test the spark	Poor or intermittent spark	1 Plug faulty or dirty 2 Contact-breaker points faulty or dirty 3 Condenser is short-circuiting 4 Ignition coil is defective

Uneven running at high engine speeds

Check	Fault	Possible Causes
Verify ignition timing	Setting wrong	1 Adjustment incorrect
Disconnect the fuel pipe from the carburettor, turn tap to 'prime', and test fuel flow	Weak flow	1 Insufficient fuel in tank 2 Fuel pipe is blocked 3 Fuel tank cap vent blocked 4 Fuel tap is clogged
Remove the carburettor and examine the jet(s)	Jet(s) blocked	1 Dirt in petrol
Fit a new main jet and test engine	Running uneven	1 Jet is too small 2 If trouble disappears with smaller jet either the air cleaner is fouled or the choke does not open fully. Check, then test with original main jet

Excessive smoke from the exhaust

Check	Fault	Possible Causes
Run at continuous high engine revs	Coloured smoke produced	1 Worn pistons, rings, bore 2 Oil pump setting wrong 3 Rings fitted inverted 4 Damage to pistons or bores 5 Faulty crankcase seals 6 Residual oil in silencer

Apparent power loss

Check	Fault	Possible Causes
Adjustment of clutch	Clutch slips	1 Weakened springs 2 Worn or distorted clutch plates 3 Worn or distorted friction linings

Check	*Fault*	*Possible Causes*
Operate the clutch and engage gear at low speed	Engine stalls	1 Plates or friction disc distorted 2 Clutch springs of uneven strength

Gear change problems

Check	*Fault*	*Possible Causes*
	Faulty gear selection or jumps out of gear	1 Dogs or gears worn 2 Selector bent or worn 3 Selector mechanism faulty

Noises

Apparent Source	*Check*	*Possible Causes*
Tinkling from region cylinder head	Plugs	1 Wrong plugs 2 Faulty plugs 3 Fuel octane too low
Metallic knock or ringing from cylinder	Internals	1 Worn pistons, rings bores 2 Worn small-end bearings 3 Pinking, caused by excess carbon in the head
Rattle from clutch side of engine	Clutch	1 Clutch drum slots worn, allowing plates to move 2 Clutch body loose
Rumble from engine	Crankshaft	1 Excessive end float 2 Worn or damaged main bearings

Steering Troubles

Check	*Fault*	*Possible Causes*
Tyre pressures	Machine tends to skid or pull either way	1 Too hard 2 Too soft 3 Not adjusted for pillion passenger
Free side-to-side fork movement	Machine tends to skid or pull either way	1 Head bearings too tight 2 Steering race balls damaged 3 Stem is bent
Vibration from front or rear wheels	Machine tends to skid or pull either way	1 Wheel bearings worn 2 Dented wheel rims 3 Rear fork pivot and/or bushing loose or worn 4 Distorted wheel 5 Faulty tyre

Check	*Fault*	*Possible Causes*
	Machine tends to skid or to pull one side only	1 Unbalanced dampers 2 Wheels out of line 3 Front fork bent 4 Frame distorted 5 Front spindle bent 6 Loose head bearing

Springing Troubles

Check	*Fault*	*Possible Causes*
Tyre pressures	Unsatisfactory operation of suspension	1 Too hard 2 Too soft 3 Not adjusted for pillion passenger
Tyre pressures too hard	Unsatisfactory operation of suspension	1 Front or rear damper not operating
Tyre pressures too soft	Unsatisfactory operation of suspension	1 Weakened spring 2 Load is too great
	Noisy operation	1 Friction between the fixed and moving parts of the damper 2 Friction between the casing and the spring 3 Hydraulic fluid level incorrect at front or rear due to leakage

Braking Troubles

Check	*Fault*	*Possible Causes*
Adjustment at front and rear	Brakes lack power	1 Front or rear brake binds 2 Contact between shoe and drum defective 3 Water in the drums 4 Oil or greases on the linings
Adjustment at front and rear	No adjustment possible	1 Linings are worn 2 Operating cam worn 3 Shoe worn at point of contact with cam
Apply brakes	Noisy operation	1 Wear on linings 2 Dirt on the linings 3 Lining faces rough 4 Operating-arm bush worn

Index

PITMAN BIKEBOOKS

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GT 185

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